THEMIS

Installation Manual

RES-32XR3

Configuration 3

3RU 19” Rack-Mount Rugged Enterprise Server with
X8DT3/X8DT3-F/X8DT3-LN4F Motherboard Configurations/
Two Quad/Dual-Core 5500 or Quad/Six-Core 5600 Xeon™ CPUs

RES-32XR3 - Configuration 3

Two Quad/Dual-Core 5500 or Quad/Six-Core 5600 Xeon CPUs

RES-32XR3 - Configuration 3

Two Quad/Dual-Core 5500 or Quad/Six-Core 5600 Xeon CPUs

RES-32XR3 - Configuration 3

Two Quad/Dual-Core 5500 or Quad/Six-Core 5600 Xeon CPUs

RES-32XR3 - Configuration 3

Two Quad/Dual-Core 5500 or Quad/Six-Core 5600 Xeon CPUs

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Two Quad/Dual-Core 5500 or Quad/Six-Core 5600 Xeon CPUs

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Two Quad/Dual-Core 5500 or Quad/Six-Core 5600 Xeon CPUs

RES-32XR3 - Configuration 3

Two Quad/Dual-Core 5500 or Quad/Six-Core 5600 Xeon CPUs

*RES-32XR3 Installation Manual - Configuration 3**

Version 1.2— October 2011

* SuperMicro Motherboards X8DT3 / X8DT3-F / X8DT3-LN4F

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This product complies with the European EMC Directive (2004/108/EC) and the European Low Voltage Safety Directive (2006/95/EC)/.

Safety Precautions

Instructions regarding safety precautions during installation, operation, or maintenance of the equipment are given in the section entitled “Safety Instructions” on page -iv.

WARNINGS and CAUTIONS

The definitions of WARNINGS and CAUTIONS as used in this document are given in the Preface in the section entitled “Notes, Cautions, Warnings, and Sidebars”.

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- Corrected year of copyright on page ii.
- Added the Chapter Number to the header of all odd pages.
- Added index entries to the manual.
- Added P/N: 118188-024 to *Table 2*, page xxi
- Added clarifying text to *Table 1-2* on page 1-2 regarding SAS/SATA support.
- Added *Table 1-3,"Power Supply LED Behavior,"* on page 1-7
- Updated Chapter 3, "BIOS Setup Utility" to the current AMI Revision.
- Moved "Repackaging for Shipment" to Appendix F.
- Added Appendix E, “Optional RES Audio/USB/Serial Port Module” to manual.
- Added “-Deep” to the size (in inches), located in the title of the three manual matrix tables in the Preface.
- Assorted minor edits and changes throughout the manual

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- Added Version number to header of even pages.
- Added footnote in *Table 2* stating that the RES XR3 17.07”-Deep chassis models would be referred to as 17”-Deep.
- Added footnote in *Table 1-6* stating that specifications are dependent on configuration in this manual.
- Added info in *Table 1-4* indicating that motherboard X8DT3-LN4F includes two extra LAN ports (LAN 3&4).
- Added note about BIOS fan speed being set to quietest mode (Energy Saving/ES).
- Assorted minor edits and changes throughout the manual.

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Safety Instructions

To maximize user safety and ensure correct device operation, all instructions contained in this section should be read carefully.

Caution: It is important that the user observe all warnings and instructions that are on the device and contained in this manual.

- The device must be used in accordance with the instructions for use.
- Electrical installations in the room must correspond to the requirements of respective regulations.
- Take care that there are no cables, particularly mains cables, in areas where persons can trip over them.
- Do not use a mains connection in sockets shared by a number of other power consumers. Do not use an extension cable.
- Only use the mains cable supplied.
- The unit is completely disconnected from the power source only when the power cord is disconnected from the power source. Therefore the power cord and its connectors must always remain easily accessible.
- Do not set up the device in the proximity of heat sources or in a damp location. Make sure the device has adequate ventilation.
- All connection cables must be screwed or locked to the chassis housing.
- The device is designed to be used in horizontal position only.
- The device is no longer safe to operate when
  - — the device has visible damage or
  - — the device no longer functions.
- In these cases, the device must be shut down and secured against unintentional operation.
- Repairs may only be carried out by a person authorized by Themis Computer.
- The device may only be opened for the installation and removal of extension (PCI) cards, memory modules, storage drives, fan housings, power supplies,

and the lithium battery—all in accordance with the instructions given in this manual.

- If extensions are made to the device, the legal stipulations and the device specifications must be observed.
- The device must be switched off when removing the top cover; for example, before installing extension (PCI) cards.

Operation of Laser Source Devices

DVD/CD-ROM drives contain laser light-emitting diodes (classified in accordance with IEC 825-1:1993: LASER CLASS 1) and, therefore, must not be opened.

If the enclosure of such a drive is opened, invisible laser radiation is emitted. Do not allow yourself to be exposed to this radiation.

The laser system meets the code of Federal Regulations 21 CFR,1040 for the USA and Canadian Radiation Emitting Devices Act, REDR C 1370.

Electrostatic Discharge (ESD)

A sudden discharge of electrostatic electricity can destroy static-sensitive devices or micro-circuitry. Proper packaging and grounding techniques are necessary precautions to prevent damage. Always take the following precautions:

1. Transport boards in static-safe containers such as boxes or bags.
2. Keep electrostatic-sensitive parts in their containers until they arrive at static-free stations.
3. Always be properly grounded when touching a sensitive board, component, or assembly.
4. Store electrostatic-sensitive boards in protective packaging or on conductive foam.

Grounding Methods

Guard against electrostatic damage at workstations by following these steps:

1. Cover workstations with approved anti-static material. Provide a wrist strap connected to a work surface and properly grounded tools and equipment.

2. Use anti-static mats, heel straps, or air ionizers to give added protection.
3. Handle electrostatic-sensitive components, boards, and assemblies by the case or the PCB edge.
4. Avoid contact with pins, leads, or circuitry.
5. Turn off power and input signals before inserting and removing connectors or test equipment.
6. Keep the work area free of non-conductive materials such as ordinary plastic assembly aids and Styrofoam.
7. Use field service tools, such as cutters, screwdrivers, and vacuums that are conductive.
8. Always place drives and boards PCB-assembly-side down on the foam.

Instructions for the Lithium Battery

Systems are equipped with a lithium battery installed on the motherboard. To replace this battery, please observe the instructions that are described in this manual.

Warning: There is a danger of explosion when the wrong type of battery is used as a replacement.

Table of Contents

Safety Instructions iv

Preface xix

1. Overview and Specifications 1-1

1.1 Overview 1-1

1.2 System LEDs and I/O Connectors 1-6

1.3 Chipset Overview 1-10

1.3.1 The 5500/5600 Series CPU and the 5520 Chipset 1-10

1.4 Special Features 1-11

1.4.1 Recovery from AC Power Loss 1-11

1.5 PC Health Monitoring 1-11

1.5.1 Fan Status Monitor with Firmware Control 1-11

1.5.2 Environmental Temperature Control 1-11

1.5.3 System Resource Alert 1-12

1.6 ACPI Features 1-12

1.6.1 Slow Blinking LED for Suspend-State Indicator 1-12

1.6.2 Main Switch Override Mechanism 1-13

1.6.3 Wake-On-LAN (WOL) 1-13

1.7 Super I/O Controller 1-14

1.8 Specifications 1-15

1.8.1 General 1-15

1.8.2 Electrical 1-16

1.8.2.1 System Power 1-16

1.8.2.2 Output Voltage 1-16

1.8.3 Environmental 1-17

1.8.3.1 Shock 1-17

1.8.3.2 Electrostatic Discharge 1-17

1.8.3.3 Noise 1-17

1.9 Packaging and Shipping 1-19

1.9.1 Accessory Kit 1-19

1.9.2 Rack-Mount Slides (Optional) 1-20

2. Installation and Operation 2-1

2.1 Installation Procedures 2-1
2.1.1 Remove Protective Top Cover 2-1
2.1.2 Memory Modules 2-3
2.1.2.1 Installation 2-4
2.1.3 PCI Cards 2-7
2.1.3.1 Installing Cards 2-7
2.1.4 Lithium Battery 2-8
2.1.4.1 Removing the Lithium Battery 2-8
2.1.4.2 Installing a Lithium Battery 2-9
2.1.5 SAS/SATA II Storage Drive 2-9
2.1.5.1 Opening the RES-32XR3 Front Doors 2-10
2.1.5.2 Storage-Drive Removal 2-10
2.1.5.3 Storage-Drive Installation 2-11
2.1.6 Removable 120-mm Fan 2-12
2.1.6.1 Removing and Installing a 120-mm Fan 2-12
2.1.7 Power Supply 2-13
2.1.7.1 Removing a Power Supply 2-13
2.1.7.2 Installing a Power Supply 2-14

2.2 Rack Mounts 2-15
2.2.1 Mounting Brackets 2-15
2.2.2 Rack-Mount Slides (Optional) 2-15

2.3 Operation 2-16
2.3.1 Plugging in the AC Power Cords 2-16
2.3.2 Turning the System On 2-16
2.3.3 Getting Started 2-17
2.3.3.1 Configuration 2-17
2.3.3.2 Linux Installation 2-17
2.3.4 Turning the System Off 2-17

3. BIOS Setup Utility 3-1

3.1 Introduction 3-1
3.1.1 Starting BIOS Setup Utility 3-1
3.1.2 How To Change the Configuration Data 3-2
3.1.3 Starting the Setup Utility 3-2

3.2 Main Setup 3-3
3.2.1 System Overview 3-3
3.2.1.1 System Time/System Date 3-3
3.2.1.2 Supermicro X8DTi 3-4
3.2.1.3 Processor 3-4
3.2.1.4 System Memory 3-4
3.3 Advanced Setup Configurations 3-5
3.3.1 BOOT Features 3-5
3.3.1.1 Quick Boot 3-5
3.3.1.2 Quiet Boot 3-5
3.3.1.3 AddOn ROM Display Mode 3-6
3.3.1.4 Bootup Num-Lock 3-6
3.3.1.5 Wait For 'F1' If Error 3-6
3.3.1.6 Hit 'Del' Message Display 3-6
3.3.1.7 Interrupt 19 Capture 3-6
3.3.2 Power Configuration 3-6
3.3.2.1 Power Button Function 3-6
3.3.2.2 Restore on AC Power Loss 3-7
3.3.2.3 Watch Dog Timer 3-7
3.3.3 Processor and Clock Options 3-7
3.3.3.1 Ratio CMOS Setting 3-7
3.3.3.2 C1E Support 3-7
3.3.3.3 Hardware Prefetcher 3-7
3.3.3.4 Adjacent Cache Line Prefetch 3-8
3.3.3.5 MPS and ACPI MADT Ordering 3-8
3.3.3.6 Max CPUID Value Limit 3-8
3.3.3.7 Intel® Virtualization Technology 3-8
3.3.3.8 Execute-Disable Bit Capability 3-8
3.3.3.9 Intel AES-NI 3-9
3.3.3.10 Simultaneous Multi-Threading 3-9
3.3.3.11 Active Processor Cores 3-9
3.3.3.12 Intel® EIST™ Technology 3-9
3.3.3.13 Intel® Turbo Boost 3-9
3.3.3.14 Performance/Watt Select 3-9
3.3.3.15 Intel® C-STATE Tech 3-9
3.3.3.16 C State package Limit Setting 3-10
3.3.3.17 C1 Auto Demotion 3-10
3.3.3.18 C3 Auto Demotion 3-10

3.3.3.19 Clock Spread Spectrum 3-10
3.3.4 Advanced Chipset Control 3-10
3.3.4.1 QPI Links Speed 3-10
3.3.4.2 QPI Frequency 3-10
3.3.4.3 QPI L0s and L1 3-11
3.3.4.4 Memory Frequency 3-11
3.3.4.5 Memory Mode 3-11
3.3.4.6 Demand Scrubbing 3-11
3.3.4.7 Patrol Scrubbing 3-11
3.3.4.8 Throttling - Closed Loop 3-11
3.3.5 Northbridge Configuration 3-11
3.3.5.1 Intel I/OAT 3-12
3.3.5.2 DCA (Direct Cache Access) 3-12
3.3.5.3 DCA Prefetch Delay 3-12
3.3.5.4 IOH PCI-E Max Payload Size 3-12
3.3.5.5 Intel VT-d 3-12
3.3.5.6 Active State Power-Management 3-12
3.3.6 Southbridge Configuration 3-13
3.3.6.1 USB Functions 3-13
3.3.6.2 Legacy USB Support 3-13
3.3.6.3 USB 2.0 Controller 3-13
3.3.6.4 USB 2.0 Controller Mode 3-13
3.3.6.5 BIOS EHCI Hand-Off 3-13
3.3.6.6 Reserved Page Rout 3-13
3.3.7 IDE/SATA Configuration 3-14
3.3.7.1 SATA#1 Configuration 3-14
3.3.7.2 SATA#2 Configuration 3-14
3.3.7.3 Primary IDE Master / Slave, Secondary IDE Master / Slave, Third IDE Master, and Fourth IDE Master 3-14
3.3.7.4 IDE Detect Timeout (sec) 3-17
3.3.8 PCI/PnP Configuration 3-17
3.3.8.1 Clear NVRAM 3-17
3.3.8.2 Plug & Play OS 3-17
3.3.8.3 PCI Latency Timer 3-17
3.3.8.4 PCI IDE Bus Master 3-17
3.3.8.5 SR-IOV Supported 3-17
3.3.8.6 Slot 1 Option ROM~Slot 6 Option ROM 3-17
3.3.8.7 Onboard LAN Options ROM Select 3-18

3.3.8.8 LAN1 Option ROM/LAN2 Options ROM/LAN3 Option ROM/LAN4 Option ROM 3-18
3.3.9 Super IO Device Configuration 3-18
3.3.9.1 Onboard Floppy Controller 3-18
3.3.9.2 Floppy A 3-18
3.3.9.3 Serial Port1 Address/ Serial Port2 Address 3-18
3.3.9.4 Serial Port3 Address 3-19
3.3.10 Remote Access Configuration 3-19
3.3.10.1 Remote Access 3-19
3.3.11 System Health Configuration 3-20
3.3.11.1 CPU Overheat Alarm 3-20
3.3.11.2 CPU1 Temperature/CPU2 Temperature/ System Temperature 3-21
3.3.11.3 System Temperature 3-22
3.3.11.4 Voltage Monitoring..... 3-22
3.3.11.5 Fan Speed Control Modes 3-22
3.3.11.6 Fan1—Fan 8 Reading 3-23
3.3.12 ACPI Configuration 3-23
3.3.12.1 ACPI Aware O/S 3-23
3.3.12.2 ACPI Version Features 3-23
3.3.12.3 ACPI APIC Support 3-23
3.3.12.4 APIC ACPI SCI IRQ 3-23
3.3.12.5 Headless Mode 3-23
3.3.12.6 NUMA Support 3-23
3.3.12.7 WHEA Support 3-24
3.3.12.8 High Performance Event Timer 3-24
3.3.13 Trusted Computing 3-24
3.3.13.1 TCG/TPM (Trusted Platform Module) Support 3-24
3.3.14 IPMI Configuration 3-24
3.3.14.1 Status of BMC 3-25
3.3.14.2 IPMI Firmware Revision 3-25
3.3.15 View BMC System Event Log 3-25
3.3.15.1 Clear BMC System Event Log 3-25
3.3.16 Set LAN Configuration 3-26
3.3.16.1 Channel Number 3-26
3.3.16.2 Channel Number Status 3-26
3.3.16.3 IP Address Source 3-26
3.3.17 IP Address Configuration 3-26

3.3.17.1 Parameter Selector 3-26
3.3.17.2 IP Address 3-26
3.3.17.3 Current IP Address in BMC 3-27
3.3.18 MAC Address Configuration 3-27
3.3.18.1 Parameter Selector 3-27
3.3.18.2 MAC Address 3-27
3.3.18.3 Current MAC Address in BMC 3-27
3.3.19 Subnet Mask Configuration 3-27
3.3.19.1 Parameter Selector 3-27
3.3.19.2 Subnet Mask 3-27
3.3.19.3 Current Subnet Mask in the BMC 3-27
3.3.19.4 Gateway Address 3-28
3.3.19.5 Mac Address 3-28
3.3.20 Event Log Configuration 3-28
3.3.20.1 View Event Log 3-28
3.3.20.2 Mark all events as read 3-28
3.3.20.3 Clear event log 3-28
3.3.20.4 PCIE Error Log 3-28
3.4 Security Settings 3-29
3.4.1 Supervisor Password 3-29
3.4.2 User Password 3-29
3.4.3 Change Supervisor Password 3-29
3.4.4 User Access Level 3-30
3.4.5 Change User Password 3-30
3.4.6 Clear User Password 3-30
3.4.7 Password Check 3-30
3.5 Boot Configuration 3-31
3.5.1 Boot Device Priority 3-31
3.5.2 Storage Drives 3-31
3.5.3 Removable Drives 3-32
3.5.4 CD/DVD Drives 3-32
3.5.5 USB Drives 3-32
3.6 Exit Options 3-33
3.6.1 Save Changes and Exit 3-33
3.6.2 Discard Changes and Exit 3-33
3.6.3 Discard Changes 3-34
3.6.4 Load Optimal Defaults 3-34

3.6.5 Load Fail-Safe Defaults 3-34
3.7 BIOS Recovery 3-35
3.7.1 How to Recover the AMIBIOS Image (the Main BIOS Block) 3-35
3.7.2 Boot Sector Recovery from a USB Device 3-35
3.7.3 Boot Sector Recovery from an IDE CD-ROM 3-36
3.7.4 Boot Sector Recovery from a Serial Port (“Serial Flash”) 3-36

Appendix A. Connector Pinouts A-1
A.1 PS/2 Keyboard and Mouse A-1
A.2 USB Ports A-2
A.3 Serial Port A-2
A.4 SVGA Monitor Port A-3
A.5 Gigabit Ethernet LAN Ports A-4
A.6 IPMI Dedicated LAN Port A-4

Appendix B. Rack-Mount Slide Installation B-1

Appendix C. Red Hat Enterprise Linux 5 Installation C-1
C.1 Introduction C-1
C.2 Installation C-1

Appendix D. Optional Remote On/Off Switch D-1
D.1 Remote On/Off Configuration D-1
D.2 Remote On-Only Configuration D-2
D.3 Ordering the Remote On/Off Switch D-2

Appendix E. Optional RES Audio/USB/Serial Port Module D-1
E.1 RES Audio/USB/Serial Port Custom Module D-1
E.1.1 Attach I/O Cables D-3
E.1.2 Connector Pinouts D-4
E.1.2.1 USB Ports A and B D-4
E.1.2.2 Serial Port COM1 ..... D-5
E.1.2.3 Stereo Audio Ports (Optional) D-6
E.2 Ordering the RES Audio/USB/Serial Port Custom Module D-7

Appendix F. Repackaging Instructions E-1

F.1 Repackaging for Shipment E-1

F.2 Packaging Components E-2

F.3 Instructions for Repackaging E-3

Index Index-1

Reader Comment Card

List of Figures

Figure 1 Rugged Enterprise Server RES-32XR3 Configuration 3 xix

Figure 2 Front View of a Standard Rear-I/O RES-32 Chassis..... xxii

Figure 3 Rear View of a Standard Rear-I/O RES-32 Chassis..... xxiii

Figure 4 Front View of a Front-I/O RES-32 Chassis..... xxiii

Figure 5 Rear View of a Front-I/O RES-32 Chassis..... xxiii

Figure 1-1 RES-32XR3 Configuration 3 (with Rack Mounts)..... 1-1

Figure 1-2 X8DT3 Motherboard Block Diagram..... 1-3

Figure 1-3 External Features of RES-32XR3 Configuration 3 1-4

Figure 1-4 Major Components of RES-32XR3 Configuration 3 1-5

Figure 1-5 RES-32XR3 Configuration 3 System LEDs and I/O Connectors 1-6

Figure 1-6 RES-22XR3 with Front Sound Baffle Installed (Front View) 1-17

Figure 1-7 RES-22XR3 with Rear Sound Baffle Installed (Rear View)..... 1-18

Figure 2-1 Remove the RES-32XR3 Protective Access Cover..... 2-2

Figure 2-2 Remove Air-Flow Deflector Screws..... 2-4

Figure 2-3 Memory Module Slot Locations..... 2-5

Figure 2-4 Memory Module Removal..... 2-6

Figure 2-5 PCI Card Installation, RES-32XR3 Configuration 3..... 2-7

Figure 2-6 PCI Card Clamp..... 2-7

Figure 2-7 The RES-32XR3 Configuration 3 Lithium Battery and Socket 2-8

Figure 2-8 Opening the RES-32XR3 Configuration 3 Front (Bezel) Doors..... 2-9

Figure 2-9 Unlocking the RES-32XR3 Storage Drives..... 2-10

Figure 2-10 RES-32XR3 Storage-Drive Removal 2-11

Figure 2-11 The RES-32XR3 Configuration 3 120-mm-Fans 2-12

Figure 2-12 The RES-32XR3 Power Supply Locking Mechanism 2-13

Figure 2-13 Right Rack-Mount Bracket..... 2-15

Figure 2-14 AC Power Socket and LED on the RES-32XR3 Configuration 3 Rear 2-16
Figure 2-15 System Power Button and LED on the RES-32XR3 Front 2-16
Figure 3-1 Main BIOS Setup Screen 3-3
Figure 3-2 Advanced Settings Screen 3-5
Figure 3-3 Security Settings 3-29
Figure 3-4 Boot Settings 3-31
Figure 3-5 Exit Options 3-33
Figure 3-6 AMI_FLSH Hyperterminal 3-38
Figure 3-7 ROM File Extraction 3-38
Figure 3-8 FLASH Recovery 3-39
Figure A-1 USB Connector Pinout A-2
Figure A-2 COM1 Serial Connector Pinout A-2
Figure A-3 RES-32XR3 SVGA Connector Pinout A-3
Figure A-4 Ethernet Connector, Type RJ45 ..... A-4
Figure B-1 Screw Locations for Rack-Mount Slides B-1
Figure B-2 RES-32XR3 Rack-Mount Slide Installation B-3
Figure C-1 Power On after Linux DVD is Inserted into Drive C-2
Figure C-2 Skip Key C-2
Figure C-3 Welcome Screen C-3
Figure C-4 Language Selection C-4
Figure C-5 Selecting Layout Type C-5
Figure C-6 Enter Installation Number C-6
Figure C-7 Partitioning C-7
Figure C-8 Reviewing Option C-8
Figure C-9 Creating a Custom Layout C-9
Figure C-10 Setting Up Boot Loader C-10
Figure C-11 Master Boot Record (MBR) C-11
Figure C-12 Network Devices List C-12

Figure C-13 Edit Interface Pop-Up Screen C-13
Figure C-14 Selecting Time Zone C-14
Figure C-15 Setting Up Root Account and Password C-15
Figure C-16 Package Installation Default Screen C-16
Figure C-17 Optional Packages C-17
Figure C-18 Option to Review or Continue C-18
Figure C-19 Installation Begins C-18
Figure C-20 Installation is Complete C-19
Figure C-21 Login Screen C-20
Figure C-22 Ready to use the Desktop C-20
Figure D-1 Remote On/Off Switch Module D-1
Figure E-1 RES Audio/USB/Serial Port Custom Module D-1
Figure E-2 Install the RES Audio/USB/Serial Port Custom Module D-2
Figure E-3 Attach the Appropriate I/O Cables D-3
Figure E-4 Dual USB Connector Pinouts D-4
Figure E-5 COM1 Serial Connector Pinout D-5
Figure E-6 Stereo Audio Connector Pinout D-6
Figure F-1 Packaging Components E-2
Figure F-2 Order of Assembly E-3

List of Tables

Table 1 RES-x2XR3 20”- Deep Chassis Manual Matrix xx
Table 2 RES-x2XR3S / RES-x1XR3 17”-Deep Chassis Manual Matrix xxi
Table 3 Front I/O 16”-Deep Chassis Manual Matrix xxii
Table 1-1 RES-32XR3 Configuration 3 Motherboard Options 1-2
Table 1-2 Major Features of the RES-32XR3 Configuration 3 1-2
Table 1-3 Power Supply LED Behavior 1-7

Table 1-4 System LEDs 1-8
Table 1-5 I/O Connectors 1-9
Table 1-6 RES-32XR3 General Specifications 1-15
Table 1-7 RES-32XR3 Electrical Specifications 1-16
Table 1-8 Approximate Weights of the RES Series 1-20
Table 2-1 RES-32XR3 Configuration 3 Memory Capacity 2-3
Table 2-2 RES-32XR3 Configuration 3 Memory Population 2-3
Table 3-1 PIO Mode Select Options 3-15
Table 3-2 DMA Mode Select Options 3-16
Table A-1 PS/2 Keyboard/Mouse Pinout and Signal Descriptions A-1
Table A-2 USB Connector Pinout Signal Descriptions A-2
Table A-3 COM1 Serial Connector Pinout Signal Descriptions A-2
Table A-4 RES-32XR3 SVGA Connector-Pin Signals A-3
Table A-5 RJ45 Ethernet Pinout Signals A-4
Table E-1 Dual USB Connector Pinout Signal Descriptions (J10) D-4
Table E-2 COM1 Serial Connector Pinout Signal Descriptions (J8 and J9) D-5
Table E-3 Stereo Audio Out Connector Pinout Signal Descriptions (J1) D-6

Preface

This document, entitled RES-32XR3 *Installation Manual—Configuration 3*, provides instructions on how to install, configure, power up, and boot the Themis Rugged Enterprise Server RES-32XR3 Configuration 3 (see *Figure 1* below), which is based on two 64-bit Intel® 5500-Series Xeon™ Quad/Dual-Core CPUs or two Intel® 5600-Series Xeon™ Quad/Six-Core CPUs.

RES-32XR3 Configuration 3 supports one of three motherboards in a 20” chassis:

- SuperMicro **X8DT3**
- SuperMicro **X8DT3-F**
- .SuperMicro **X8DT3-LN4F**

(a matrix describing 20” chassis configurations is given in *Table 1*, page xx. A matrix describing 17” chassis configurations is given in *Table 2* on page xxi).

Figure 1. Rugged Enterprise Server RES-32XR3 Configuration 3

Table 1. RES-*x*2XR3 20”- Deep Chassis Manual Matrix (AC and DC Power Supplies)

Category	Motherboard[a]	CPU Sockets	RES-32XR3 Manual Part Number	RES-22XR3 Manual Part Number	RES-22XR3 with Riser Manual Part Number	RES-12XR3 Manual Part Number
Configuration 1	X8DTH-iF X8DTH-6F	**2**	**116790-024**	**116789-024**		
Configuration 2	X8DTi X8DTi-F X8DTi-LN4F	**2**	**117022-024**	**117017-024**		
Configuration 3	X8DT3 X8DT3-F X8DT3-LN4F	**2**	**117023-024**	**117018-024**		
Configuration 4	X8DTN+	**2**	**117024-024**	**117019-024**		
Configuration 5	X8DAi X8DA3	**2**	**117025-024**	**117020-024**		
Configuration 6*	X8DAH+-F	**2**	**117026-024**	**117021-024**		
Configuration 7	X8DTU-F				**117280-024**	**116970-024**

Naming Key: X8D*vwxyz*

- System RES-*x*2XR3, where *x* = 3, 2, or 1

v: A = Sound chip; no graphics chip
T = Graphics chip; no sound chip
* Configuration 6 motherboard X8DAH+-F supports both audio and video; however, the naming key does not contain a “T” in the title.

w: H = Two Tylersberg Northbridge chips
blank = One Tylersberg Northbridge chip
U = Motherboard with cutout

x: i = SATA only
3 = SAS 1.0
6 = SAS 2.0

y: LN4 = Extra gigabit Ethernet controller for two extra ports

z: F = IPMI
blank = No IPMI

a—All motherboards measure 12”W x 13”L except X8DTN+ and X8DAH+-F, which are 13.68”W x 13” L.

Table 2. RES-*x*2XR3S / RES-*x*1XR3 17”-Deep[a] Chassis Manual Matrix (AC and DC Power Supplies)

Mother-board	CPU Sockets	RES-32XR3S Manual P/N	RES-22XR3S Manual P/N	RES-12XR3S Manual P/N	RES-31XR3 Manual P/N	RES-21XR3 Manual P/N	RES-11XR3 Manual P/N
X8DTL-6F X8DTL-6	**2**	**117408-024**	**117412-024**	**117416-024**			
X8DTL-3F X8DTL-3	**2**	**117409-024**	**117413-024**	**117417-024**			
X8DTL-iF X8DTL-i	**2**	**117410-024**	**117414-024**	**117418-024**			
X8DAL-3 X8DAL-i	**2**	**117411-024**	**117415-024**	**117419-024**			
X8SAX	**1**				**117420-024**	**117421-024**	
X8ST3-F X8STE	**1**				**117385-024**	**117422-024**	
X8STi X8STi-F X8STi-LN4 X8STi-3F	**1**					**118188-024**	**117423-024**

Naming Key: X8*uvwxyz*

- System RES-*x*2XR3S and RES-*x*1XR3, where *x* = 3, 2, or 1

u: D = Double CPU sockets
S = Single CPU socket

v: A = Sound chip; no graphics chip
T = Graphics chip; no sound chip

w: Not applicable

x: i = SATA only
3 = SAS 1.0
6 = SAS 2.0

y: LN4 = Extra gigabit Ethernet controller for two extra ports

z: F = IPMI
blank = No IPMI

a—The 17”-deep RES XR3 chassis actually measures 17.07” deep, but for simplicity will continue to be referred to as being 17” deep throughout these manuals.

A matrix describing RES chassis that are configured for front-I/O connector and front-PCI card access in a 16” chassis is given in *Table 3*. This chassis design makes it more convenient to install cables to the system and demands no access to the rear of the chassis except to replace a fan. *Figure 2* shows the front view of a standard rear-I/O RES-32 chassis (*Figure 3* on page xxiii shows the rear view); *Figure 4* shows the front view of a front-I/O RES-32 chassis (*Figure 5* shows the rear view).

Table 3. Front I/O 16”-Deep Chassis Manual Matrix (AC and DC Power Supplies)

Mother-board	CPU Sockets	RES-32XR3/FIO Manual P/N	RES-22XR3/FIO Manual P/N
X8DAH+-F*****	**2**	**117611-024**	
X8DTU-F	**2**		**117664-024**

Naming Key: X8*uvwxyz* ● System RES-*x*2XR3S and RES-*x*1XR3, where *x* = 3, 2, or 1

*RES-32XR3/FIO motherboard X8DAH+-F supports both audio and video; however, the naming key does not contain a “T” in the title.

u: D = Double CPU sockets
S = Single CPU socket

v: A = Sound chip; no graphics chip
T = Graphics chip; no sound chip

w: Not applicable

x: i = SATA only
3 = SAS 1.0
6 = SAS 2.0

y: LN4 = Extra gigabit Ethernet controller for two extra ports

z: F = IPMI
blank = No IPMI

Figure 2. Front View of a Standard Rear-I/O RES-32 Chassis (Doors Removed)

Figure 3. Rear View of a Standard Rear-I/O RES-32 Chassis

Figure 4. Front View of a Front-I/O RES-32 Chassis

Figure 5. Rear View of a Front-I/O RES-32 Chassis

The 3RU-high (5.25”) RES-32XR3 Configuration 3 has been designed to fit into a standard 19” rack and is provided with rack-mount brackets with handles. *Optional* rack-mount slides are also available. The RES-32XR3 is rugged enough to withstand extreme shock (up to 35G), temperature, and EMI such as that associated with such demanding markets as the military, aerospace, and telecommunications industries.

Intel processors supported by RES-32XR3 Configuration 3 include either

- Two Intel 5500-Series Xeon Quad/Dual-Core CPUs, or
- Two Intel 5600-Series Xeon Quad/Six-Core CPUs

which operate at a QPI (QuickPath Interconnect) up to 6.4 GT/s and support a total memory capacity of 192 GigaBytes (12 16-GB DIMMs) using 1066-MHz DDR3 ECC Registered memory modules. Changing memory speeds—1333 MHz and 800 MHz—is supported by lower capacity DIMMs, hence lower total memory capacity.

RES-32XR3 Configuration 3 is based on the functionality and capability of the following Intel chipset:

- Intel 5520 (Tylersburg) chipset
- ICH10R + IOH-36D

An overview of RES-32XR3 Configuration 3 design and specifications is given in Chapter 1, "Overview and Specifications", of this manual.

This manual is intended for an experienced system administrator with a knowledge of both networking and high-speed server systems.

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Notes, Cautions, Warnings, and Sidebars

The following icons and formatted text are included in this document for the reasons described:

Note: A note provides additional information concerning the procedure or action being described.

Caution: A caution describes a procedure or action that may result in damage to the equipment. This may involve—but is not restricted to—heavy equipment or sharp objects. To reduce the risk, follow the instructions accompanying this symbol.

Warning: A warning describes a procedure or action that may cause injury or death to the operator. To reduce the risk, follow the instructions accompanying this symbol.

Sidebar: A “sidebar” adds detail to the section within which it is placed, but is not absolutely vital to the description or procedure of the section.

General Section

Chapter 1

Overview and Specifications

1.1 Overview

The **RES-32XR3 Configuration 3** (see *Figure 1-1* below; a block diagram is given in *Figure 1-2*, page 1-3) is a rack-mounted high-performance system designed specifically for above-average shock and vibration environments. The RES-32XR3 supports two Intel® 1366-pin LGA 64-bit 5500/5600-Series Xeon™ processors, each with a QPI (Quick-Path Interconnect) up to 6.4 GT/s (Giga-Transfers per second) supporting 192 GB of 1333/1066/800-MHz DDR3 ECC Registered memory modules. Its computer/graphics-intensive and diverse-I/O capabilities are ideal for military/aerospace and commercial telecommunications applications. Motherboards supported by Configuration 3 are listed in *Table 1-1* on page 1-2.

Figure 1-1. RES-32XR3 Configuration 3 (with Rack Mounts)

Table 1-1. RES-32XR3 Configuration 3 Motherboard Options

Mother-board[a]	IPMI	SATA	SAS	Memory Slots	Graph-ics	Audio	PCI-e, PCI-X, and PCI Slots				
							PCI-e x16	PCI-e x8	PCI-e x4	PCI-X	PCI
X8DT3	—	Yes	Yes	12	Yes	—	—	3	1	—	2[b]
X8DT3-F	Yes	Yes	Yes	12	Yes	—	—	3	1	—	2[b]
X8DT3-LN4F	Yes	Yes	Yes	12	Yes	—	—	3	1	—	2[b]

a—SuperMicro Computer, Inc.

b—Two 32-bit, 33-MHz PCI slots.

The RES-32XR3 is designed within a 3RU-high (5.25”) form-factor 20” (50.8 cm) deep and 17” (43.2 cm) wide (which, with mounting brackets, fits a 19”-wide rack). Major features are listed in *Table 1-2*.

Table 1-2. Major Features of the RES-32XR3 Configuration 3

Feature	Details
Processor (CPU)	• Two 1366-pin Intel quad-core 5500-Series or quad/six-core 5600-Series Xeon CPU @ up to 6.4 GT/s each
Chipset	• Intel® 5520 (Tylersburg) chipset • ICH10R (Southbridge) and IOH-36D
Memory	• Twelve (12) 240-pin DIMMs supporting up to 192GB (16GB DIMMs) of Registered ECC DDR3 1333/1066/800-MHz 72-bit SDRAM
Expansion slots	• See *Table 1-1* for details
Rear-Panel I/O	• See *Table 1-5* on page 1-9 for details
Peripheral Support	• Eight SAS, or five SATA II storage drives directly from the motherboard with one SATA header being consumed by the CD/DVD drive; additional SATA support[a] is provided by an optional PCI-card installation. • 1 combination CD-RW/DVD-ROM slimline (IDE) drive
Operating temperature	• 0° up to 65° C (32° up to 149°F)
Shock endurance	• 35G @ 25-msec duration (3 axis)
Dimensions	• 5.25” (3RU) high, 17” (43.4 cm) wide (19”/48.3 cm with mounting brackets), 20” (43.2 cm) deep
Rack-mount brackets and slides	• Left and right rack-mount tabs are attached to the chassis • Left and right rack-mount slides are *optional*
Dual power supplies	• 750 watts each, auto-ranging (100–265 VAC) • Load-sharing N+1 redundant, hot-pluggable • (*Optional*)—Choice of 750-watt (48V) or 500-watt (28V) DC Power supply

a—Chassis supports a total of 8 storage drives.

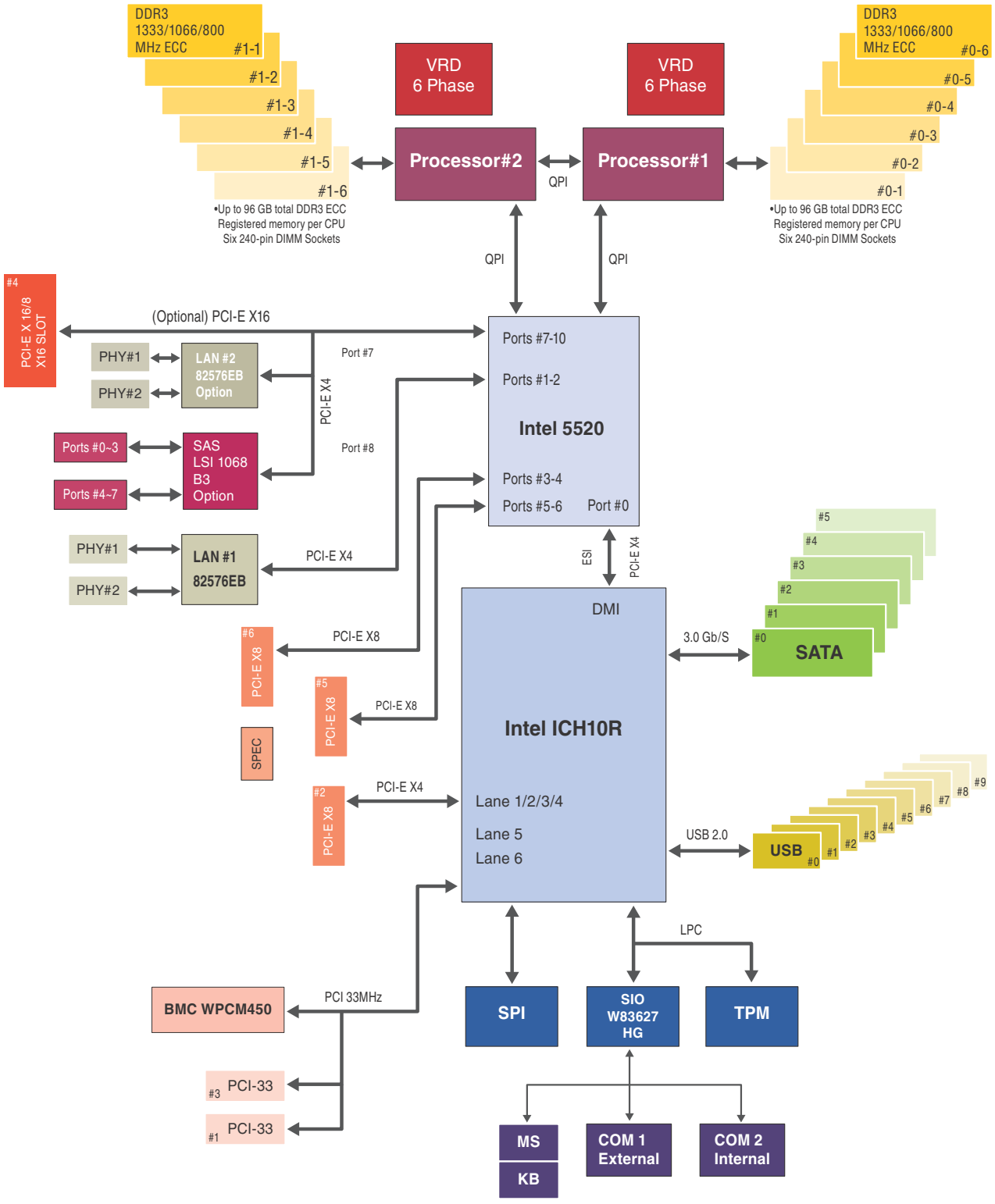


Figure 1-2. X8DT3 Motherboard Block Diagram

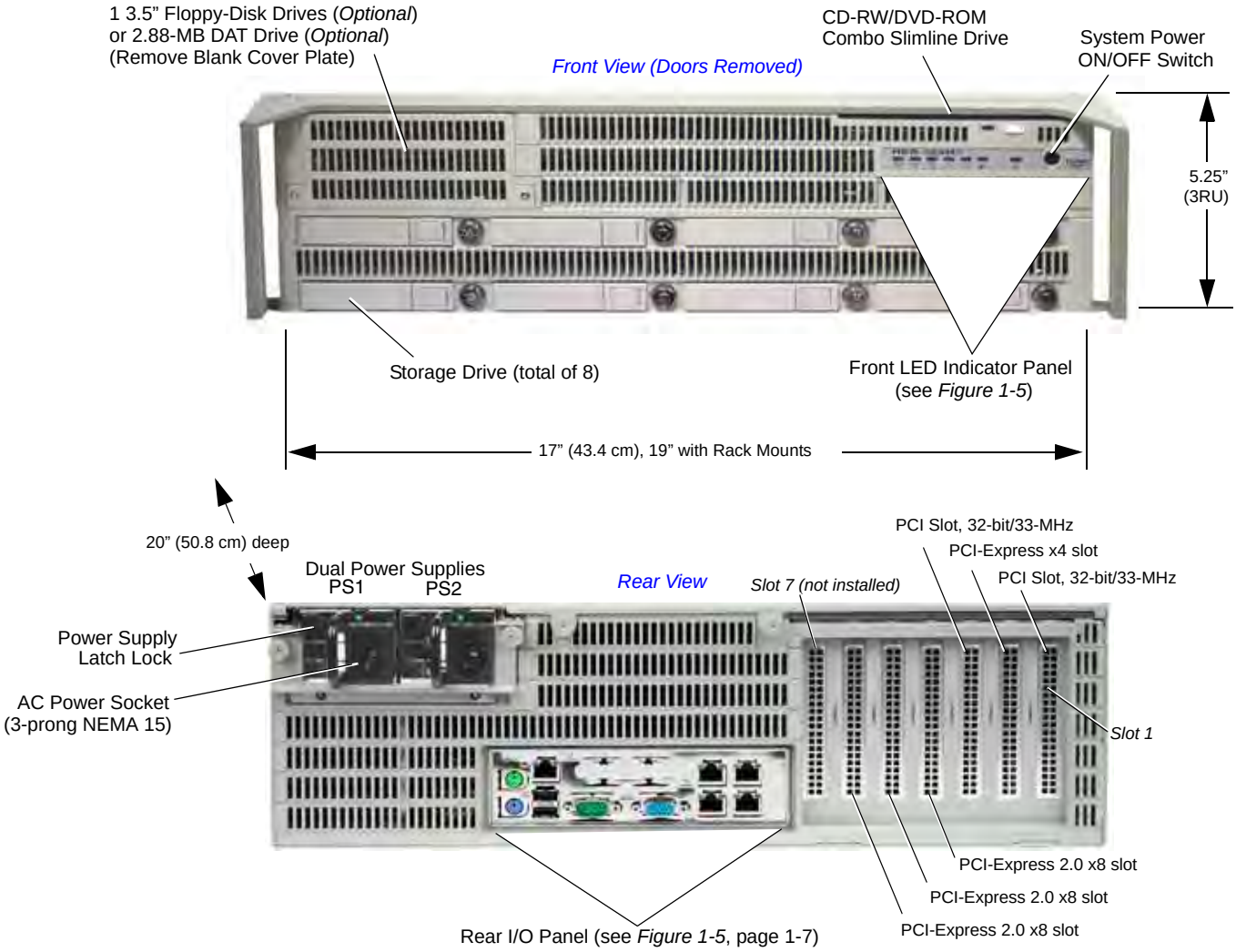


Figure 1-3. External Features of RES-32XR3 Configuration 3 (Front and Rear)

The RES-32XR3 front panel houses eight removable storage drives (see *Figure 1-3*). In addition, the front panel supports a CD-RW/DVD-ROM combo slimline drive, and a 1.44-MB 3.5" floppy-disk drive (*optional*) or a single 2.88-MB DAT drive (*optional*). All motherboards support both SAS and SATA II drives. If supported, a combination of both SATA and SAS drives may be installed. Drive requirements should be specified at the time the system is purchased.

Also included on the front panel is a system power ON/OFF button and LEDs (see *Figure 1-5*, page 1-6). The rear panel contains I/O faceplates for seven PCI cards, of which only six are used (graphics, RAID, NIC, etc.), two AC power supplies with latch locks and power-cord sockets, and all I/O connectors (*Figure 1-5*). Major features of the RES-32XR3 are described in *Table 1-2*, page 1-2. Major internal components of the RES-32XR3 Configuration 3 can be seen in the open top view (cover removed) of *Figure 1-4*.

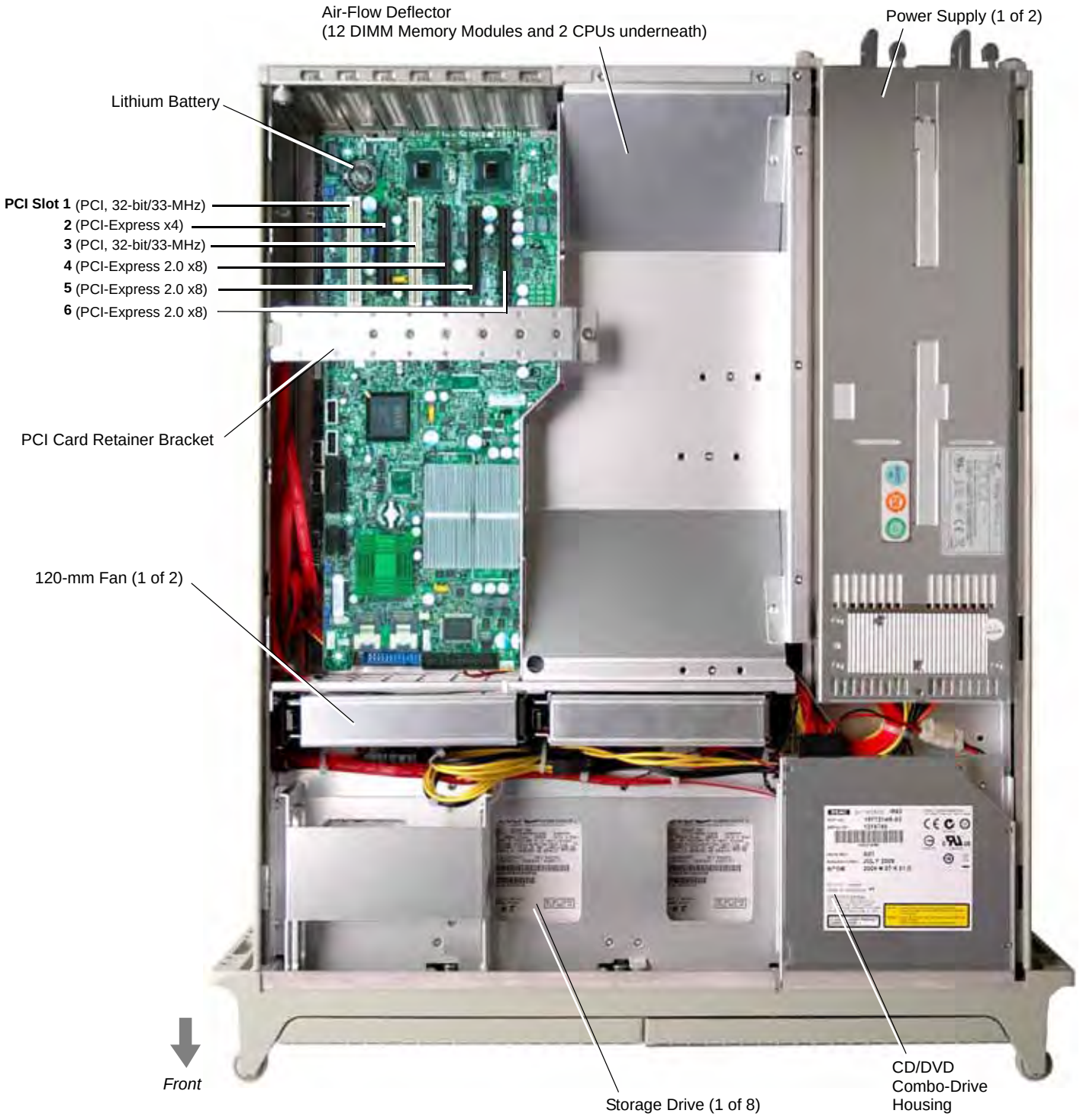


Figure 1-4. Major Components of RES-32XR3 Configuration 3 (Open Top View)

1.2 System LEDs and I/O Connectors

All RES-32XR3 system LEDs are located on the front panel (see **A**, *Figure 1-5*); all I/O connectors are located on the rear panel (see **B**, *Figure 1-5*). LEDs are described in *Table 1-4* on page 1-8; I/O connectors are described in *Table 1-5*, page 1-9.

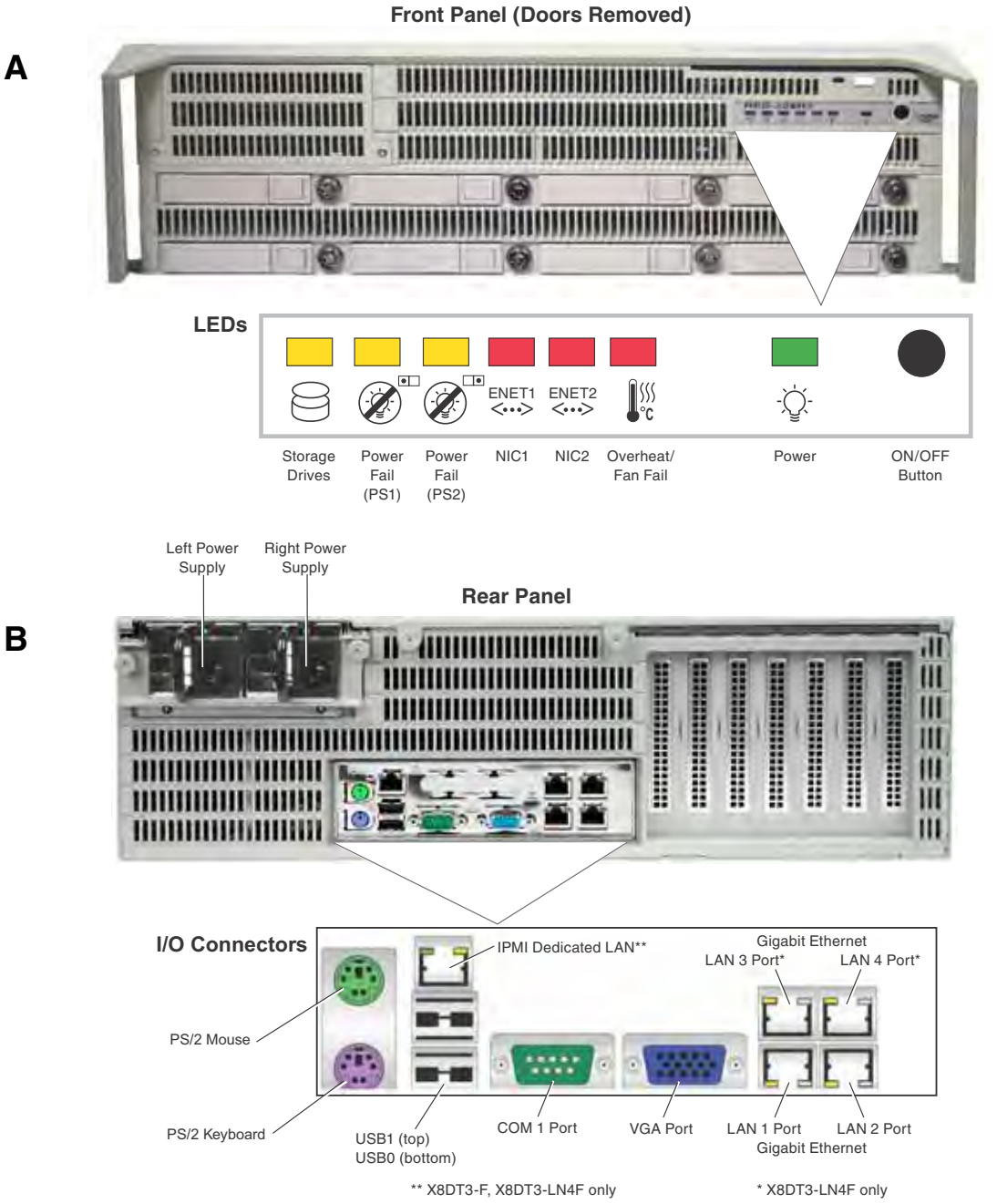


Figure 1-5. RES-32XR3 Configuration 3 System LEDs and I/O Connectors

Table 1-3. Power Supply LED Behavior

Symbol	LED Power	System LED	Description
	On (red LED)	Power Fail LED (Left Power Supply) Note: system is powered on	• If system is powered on, warns that the left power supply has failed or has lost AC input.
	On (red LED)	Power Fail LED (Right Power Supply) Note: system is powered on	• If system is powered on, warns that the right power supply has failed or has lost AC input.
 And 	Off	Power Fail LED (Left & Right Power supply) Note: system is powered on	• System is powered on and power supply modules are functioning normally, or system has been shut down and there has been no interruption to the AC power.
 Or 	On (red LED)	Power Fail LED (Left or Right Power Supply)[a] Note: system is powered off	• AC power has been interrupted to both power supply modules. When power is restored but system is still off, one of the two indicator lights will be lit.
Rear Power Supply Modules	On (green LED)	Green LED (adjacent to AC input) Note: system is powered on	• System is receiving DC power (3.3V, 5V, 12V) from the power supply module
	Off[b]	Green LED (adjacent to AC input) Note: system is powered off	• System is off and not receiving DC power from the Power Supply module.

a—This LED behavior indicates only that AC power has interrupted to both power supplies, and does not indicate which power supply module lost power first, or regained power first.

b—This LED behavior indicates that DC power is not being used, and the system is off. It does not indicate a loss of AC power to the power supply module.

Table 1-4. System LEDs

Symbol	LED	Description
	Power	● Indicates that the system is turned on.
	Storage Drive	● Indicates SAS/SATA II storage-drive activity.
ENET1	NIC1[a] (Gb Ethernet)	● Indicates network activity on LAN 1.
ENET2	NIC2 (Gb Ethernet)	● Indicates network activity on LAN 2.
	Overheat/Fan Fail —Normally OFF —RED light when temperature limits are exceeded	● Warns that the system is exceeding specified temperature parameters. The CPU overheat warning function must be enabled in the BIOS, thus allowing the user to define an overheat temperature, which—when exceeded—triggers the overheat warning LED.
Symbol	**Rear Panel LED(s)**	**Description**
N/A	LAN1 and LAN2 LAN3 and LAN4[b]	Each Ethernet port contains two LEDs: ● The color of the left LED (when facing the port) indicates the LAN connection speed: - Off = 10 MHz - Green = 100 MHz - Amber = 1 GHz ● The right LED, when lit, indicates LAN activity.

a—NIC = Network Interface Controller.

b—LAN3 and LAN4 supported by the X8DT3-LN4F motherboard.

Table 1-5. I/O Connectors

Connector	Description
PS/2 Mouse	● 6-pin mini-DIN (female) connector to attach a PS/2 mouse device.
PS/2 Keyboard	● 6-pin mini-DIN (female) connector to attach a PS/2 keyboard device.
USB 0 and USB 1 Hi-Speed USB 2.0 Serial Ports	● Two 4-pin USB connectors to attach serial devices to USB Port 0 and USB Port 1. *Note:* Two 2x5-pin USB type-A headers (2 ports each, USB4/USB5 and USB6/USB7) and 2 USB 4-pin headers (USB2 and USB3) can be accessed directly from the motherboard.
COM 1 Serial Port	● One DB9 (male) connector on rear panel to attach a serial device to COM 1port *Note:* A second serial port (COM 2) can be accessed directly from the motherboard.
Super VGA Port	● 15-pin SVGA connector to attach a monitor device.
Ethernet LAN Ports	● Standard RJ45 connector to attach one or two gigabit Ethernet LAN line(s)—LAN 1 and LAN 2. *Note:* LAN 3 and LAN 4 are supported by the X8DT3-LN4F motherboard only.
IPMI Dedicated LAN Port	● Standard RJ45 connector to attach a dedicated IPMI LAN line. (X8DT3-F and X8DT3-LN4F motherboards only).

1.3 Chipset Overview

Built upon the functionality and capability of the Intel 5520 platform, RES-32XR3 Configuration 3 provides the performance required for dual processor-based high-end systems, including optimal configuration options for communications, high-end CAD systems, or database applications. Configuration 3 motherboards support up to two quad/six-core 5600-series or two quad/dual-core 5500-series Intel 64-bit Xeon processors with a QPI up to 6.4 GT/s. The supporting Intel chipset consists of:

- the Intel 5520 (Tylersburg) chipset, and
- the ICH10R + IOH-36D

With the Intel QuickPath Interconnect (QPI) controller built in the processor, the 5500/5600 Series Processor platform is the first dual-processing platform to offer the next generation point-to-point system interconnect interface, replacing Front Side Bus Technology, providing substantial system performance enhancement by utilizing serial link interconnections, allowing for increased bandwidth and scalability. The IOH connects to each processor through an independent QuickPath Interconnect link. Each link consists of 20 pairs of unidirectional differential lanes for transmission and receiving in addition to a differential forwarded clock. A full-width QuickPath interconnect link pair provides 84 signals. Each processor supports two QuickPath links, one going to the other processor and the other to the 5520 chip.

The Intel 5520 platform supports up to 36 PCI Express Gen2 lanes, and supports peer-to-peer read and write transactions. The ICH10R provides up to 6 PCI-Express ports, six SATA ports, and 10 USB connections. Features include memory interface ECC, x4,/x8 Single Device Data Correction (SDDC), Cyclic Redundancy Check (CRC), parity protection, out-of-band register access via SMBus, memory mirroring, memory sparing, and Hot-plug support on the PCI-Express Interface.

1.3.1 The 5500/5600 Series CPU and the 5520 Chipset

- Four (5500) to six (5600) processor cores in each CPU with 8MB shared cache among cores
- Two full-width Intel QuickPath interconnect links, up to 6.4 GT/s of data transfer rate in each direction
- Virtualization Technology, Integrated Management Engine supported
- Point-to-point cache coherent interconnect, Fast/narrow unidirectional links, and Concurrent bi-directional traffic
- Error detection via CRC and Error correction via Link level retry

1.4 Special Features

1.4.1 Recovery from AC Power Loss

BIOS provides a setting for you to determine how the system will respond when AC power is lost and then restored to the system. You can choose for the system to remain powered off (in which case you must press the power switch to turn it back on) or for it to automatically return to a power- on state. See the Advanced BIOS Setup section to change this setting. The default setting is **Last State**.

1.5 PC Health Monitoring

This section describes the PC health monitoring features of the RES-32XR3 Configuration 3 motherboards. All have an onboard System Hardware Monitor chip that supports PC health monitoring. An onboard voltage monitor will scan these onboard voltages continuously:

- CPU Cores, +1.8V, +3.3V, +5V, ±12V, +3.3V Standby, +5V Standby, VBAT, HT, Memory, Chipset Voltages.

Once a voltage becomes unstable, a warning is given or an error message is sent to the screen. Users can adjust the voltage thresholds to define the sensitivity of the voltage monitor.

1.5.1 Fan Status Monitor with Firmware Control

The PC health monitor can check the RPM status of the cooling fans. The onboard chassis fans are controlled by Thermal Management in the BIOS (under Hardware Monitoring in the Advanced section).

1.5.2 Environmental Temperature Control

The thermal control sensor monitors the CPU temperature in real time and will turn on the thermal control fan whenever the CPU temperature exceeds a user-defined threshold. The overheat circuitry runs independently from the CPU. Once it detects that the CPU temperature is too high, it will automatically turn on the thermal fan control to prevent any overheat damage to the CPU. The onboard chassis thermal

circuitry can monitor the overall system temperature and alert users when the chassis temperature is too high.

Caution: To avoid possible system overheating, please be sure to provide adequate airflow to your system.

1.5.3 System Resource Alert

This feature is available when used with Supero Doctor III in the Windows OS environment or used with the Supero Doctor II in Linux. Supero Doctor is used to notify the user of certain system events. For example, you can also configure Supero Doctor to provide you with warnings when the system temperature, CPU temperatures, voltages and fan speeds go beyond a pre-defined range.

1.6 ACPI Features

ACPI stands for Advanced Configuration and Power Interface. The ACPI specification defines a flexible and abstract hardware interface that provides a standard way to integrate power management features throughout a PC system, including its hardware, operating system and application software. This enables the system to automatically turn on and off peripherals such as CD-ROMs, network cards, hard disk drives and printers.

In addition to enabling operating system-directed power management, ACPI provides a generic system event mechanism for Plug and Play and an operating system-independent interface for configuration control. ACPI leverages the Plug and Play BIOS data structures while providing a processor architecture-independent implementation that is compatible with Windows 7/XP/ 2003/ 2008/ Vista Operating Systems.

1.6.1 Slow Blinking LED for Suspend-State Indicator

When the CPU goes into a suspend state, the chassis power LED will start blinking to indicate that the CPU is in suspend mode. When the user presses any key, the CPU will wake-up and the LED will automatically stop blinking and remain on.

1.6.2 Main Switch Override Mechanism

When an ATX power supply is used, the power button can function as a system suspend button to make the system enter a SoftOff state. The monitor will be suspended and the hard drive will spin down. Pressing the power button again will cause the whole system to wake-up. During the SoftOff state, the ATX power supply provides power to keep the required circuitry in the system “alive.” In case the system malfunctions and you want to turn off the power, just press and hold the power button for 4 seconds. This option can be set in the Power section of the BIOS Setup routine.

1.6.3 Wake-On-LAN (WOL)

Wake-On-LAN is defined as the ability of a management application to remotely power up a computer that is powered off. Remote PC setup, up-dates and asset tracking can occur after hours and on weekends so that daily LAN traffic is kept to a minimum and users are not interrupted. The motherboard has a 3-pin header (WOL) to connect to the 3-pin header on a Network Interface Card (NIC) that has WOL capability. In addition, an onboard LAN controller can also support WOL without any connection to the WOL header. The 3-pin WOL header is to be used with a LAN add-on card only.

Note: Wake-On-LAN requires an ATX 2.01 (or above) compliant power supply.

1.7 Super I/O Controller

The Super I/O chip storage-drive adapter functions include:

- a floppy disk drive controller (industry standard 82077/765 compatible)
- a data separator
- write pre-compensation circuitry
- decode logic
- data rate selection
- clock generator
- drive interface control logic
- interrupt and DMA logic

The wide range of functions integrated onto the Super I/O greatly reduces the number of components required for interfacing with floppy disk drives. The Super I/O supports 360K, 720K, 1.2M, 1.44M or 2.88M disk drives, and data transfer rates of 250 Kb/s, 500 Kb/s or 1 Mb/s.

It also provides two high-speed, 16550-compatible serial communication ports (UARTs). Each UART includes a 16-byte send/receive FIFO, a programmable baud rate generator, complete modem control, and a processor interrupt system. Both UARTs provide legacy speed with baud rate of up to 115.2 Kbps, and an advanced speed with baud rates of 250 K, 500 K, or 1 Mb/s (for higher speed modems).

The Super I/O provides functions that comply with ACPI (Advanced Configuration and Power Interface), which includes support of legacy and ACPI power management through an SMI or SCI function pin. It also features auto power management to reduce power consumption.

1.8 Specifications

1.8.1 General

Table 1-6 lists general specifications for the RES-32XR3.

Table 1-6. RES-32XR3 General Specifications

Parameter	Description
Dimensions	● 5.25” (3RU) high ● 17” (43.2 cm) wide (19” rack-mountable) ● 20” (50.8 cm) deep
Weight	● Under 42 pounds (19 kg), includes 6 full-length (up to 12.25”) PCI cards, 1 CD-RW/DVD-ROM drive, 8 SAS/SATA II storage drives, and 2 power supplies ● Add 8.8 pounds (4 kg) for the shipping container and two AC power cords ● The manual and associated shipping paperwork weighs approximately 1 lb (0.5 kg)
19” Rack-Mountable with Slide capability	● Left and right rack-mount tabs attached to chassis ● Left and right rack-mount slides are *optional*
Temperature[a] Operating: Non-Operating:	 ● 0° up to 65° C (32° up to 149°F) ● -40° to 70° C (-40° to 158° F)
Relative Humidity[a] Operating: Non-Operating:	 ● 8% to 95% (non-condensing) ● 5 to 95% (non-condensing)
Maximum Wet Bulb[a] Operating: Non-Operating:	 ● 55°C, non-condensing ● 70°C, non-condensing
Altitude[a] Operating: Non-Operating	 ● 0 to 10,000 feet above sea level ● 0 to 40,000 feet above sea level

a—Specifications are dependent on the configuration in this manual.

1.8.2 Electrical

Table 1-7 lists the electrical specifications for the RES-32XR3 Configuration 3.

Table 1-7. RES-32XR3 Electrical Specifications

Parameter	Description		
	AC (120 volts, 750W)	**DC (48 volts, 750W)**	**DC (28 volts, 500W)**
Input Power (*typical*)	• 420 watts (*typical*)[a]	• 420 watts (*typical*)[a]	• 450 watts (*typical*)[a]
Input Current	• 3.5 amperes @120 Vac	• 13.5 amperes @48 Vdc	• 16 amperes @28 Vdc
Input Frequency	• 47–63 Hertz	*NA*[b]	*NA*[b]
Input Voltage	• 100–265 Vac, internally fused	• 40–72 Vdc, internally fused	• 18–36 Vdc, internally fused
Input VA Rating	• 425 VA	*NA*	*NA*
BTU Rating	• 1447 BTU/hour	• 1447 BTU/hour	• 1447 BTU/hour
Power Factor	• 0.99	*NA*	*NA*
Input Leakage Current	• 3.5 mA	*NA*	*NA*
Plug Type	• IEC	• Y-Type (SVS5-4 or equivalent)	• Y-Type (SVS5-4 or equivalent)

a—Does not include plug-in PCI cards.

b—*NA* = Not Applicable.

1.8.2.1 System Power

The RES-32XR3 operates with two N+1 redundant AC power supplies of 750-watts capacity each that auto-range single-phase AC input from 100 to 265 VAC (47 to 63 Hertz) sources. Filtered and fused (internal) AC is supplied to each power supply from a rear-mounted power connection. Two *optional* N+1 redundant DC power supplies of 750 watts (48 volts) or 500 watts (28 volts) each may be substituted for the AC power supplies (see *Table 1-7*). These supplies should be specified at the time of your order.

Note: Some AC RES systems may be installed with **650-watt** instead of **750-watt** power supplies, which should not effect the performance of the system.

1.8.2.2 Output Voltage

The RES-32XR3 power supply provides output voltages that are split between +3.3V, +5V, +$5V_{sb}$, +12V, and -12V rails.

1.8.3 Environmental

1.8.3.1 Shock

The RES-32XR3 Configuration 3 is designed to survive an elevated shock environment. All structural components are welded together, enabling the system to survive a maximum 3-axis shock load of 35G at 25-ms duration.

1.8.3.2 Electrostatic Discharge

The RES-32XR3 is designed to tolerate electrostatic pulses up to 15 kilovolts (KV) with no impact on system operation.

1.8.3.3 Noise

The RES-32XR3 conforms to the 54-db noise specification. It is possible to achieve further noise reduction by installing a sound baffle (muffler) on both the front and rear of the RES-32XR3 chassis (*Figure 1-6* and *Figure 1-7* on page 1-18 show the front and rear baffles, respectively, for a RES-22XR3 system). Call your Themis representative for additional information.

Figure 1-6. RES-22XR3 with Front Sound Baffle Installed (Front View)

Note: All RES systems are shipped with BIOS fan speed set to the quietest mode. The default fan speed control mode of the RES-32XR3 Configuration 3 is **Energy Saving/ES.**

Front Access—Opening the two front doors of the RES-32XR3 Configuration 3 requires removing the front sound baffle. To do this, loosen the two (2) captive knurled Phillips screws holding the baffle to the chassis (see **A**, *Figure 1-6* on page 1-17) and remove the baffle.

Figure 1-7. RES-22XR3 with Rear Sound Baffle Installed (Rear View)

Rear Access—Accessing the I/O connectors and PCI card I/O on the rear of the RES-32XR3 Configuration 3 requires opening the rear sound baffle door. To do this, loosen the four (4) captive knurled Phillips screws **A** holding the baffle door to the chassis (see **A** in *Figure 1-7*) and swing the door downward away from the chassis, exposing the rear connectors and PCI cards.

Removing the protective top cover for access to the interior requires that the rear sound baffle be totally removed (this can be done with the baffle door closed). To do this, five (5) M3x4 flathead Phillips screws **B** must be removed, two on each side of the baffle and one (captive) in the middle on the top (see *Figure 1-7*).

After removing the rear baffle, the top cover can be removed as described in Section 2.1.1, “Remove Protective Top Cover,” on page 2-1 (Chapter 2, "Installation and Operation").

1.9 Packaging and Shipping

The RES-32XR3 Configuration 3 is packaged in a reusable shipping container. Approximate weight of an empty container and two AC power cords is 8.8 pounds (4 kg).

The approximate weight of a RES-32XR3 Configuration 3 (loaded with 2 CPUs, 6 DIMMs, 2 storage drives, 2 full-length PCI cards, a CD-RW/DVD-ROM drive, and 2 power supplies) is approximately 28.5 pounds (12.9 kg). [See *Table 1-8*, page 1-20 for a general weight table for all models of the RES Series of computers.]

The approximate weight of a manual and associated shipping paperwork is one pound (0.5 kg).

Therefore, both the shipping container and a typical RES-32XR3 Configuration 3 including power cords, manual, and associated paperwork, weigh approximately 38.3 pounds (17.4 kg).

Caution: **Do not discard the original packaging** that your system was shipped in.

The original packaging was designed specifically to withstand the stress and rigors of today's shipping environment. It will be needed in the event the system must be shipped back to Themis Computer. See Appendix F, "Repackaging for Shipment".

1.9.1 Accessory Kit

Each RES-32XR3 Configuration 3 is packaged with an Accessory Kit, consisting of the following items:

A. Two AC Power Cords

B. Two Storage Drive Barrel Keys

When you unpack the RES-32XR3 Configuration 3, please verify that all of these items are included. If any of these items are missing or not as pictured, please call Themis Technical Support at 510-252-0870, or send an email to support@themis.com.

To learn how to secure the AC power cords and the power-cord retainer bracket, refer to Section 2.3.1, "Plugging in the AC Power Cords," on page 2-16.

1.9.2 Rack-Mount Slides (Optional)

Rack-Mount Slides can be mounted on each side of the RES-32XR3 Configuration 3 for the purpose of sliding the unit in and out of a rack. Mounting slides are optional and can be ordered at the time of purchase. Approximate weights of models in the RES series of computers are listed in *Table 1-8*.

To learn how to install rack-mount slides, refer to Appendix B, “Rack-Mount Slide Installation”.

Table 1-8. Approximate Weights of the RES Series

Model	Weight (Approximate)	CPU Sockets	Depth	Description
RES-12XR3	19.5 lbs (8.9 kg)	2	20”	Includes: ● All CPU sockets filled ● 6 DIMMs ● 2 storage drives ● 2 PCI cards ● 1 CD-RW/DVD-ROM drive ● 2 power supplies
RES-12XR3-S	17 (7.7 kg)	2	17”	
RES-11XR3	16.5 lbs (7.5 kg)	1	17”	
RES-22XR3	25 lbs (11.4 kg)	2	20”	Includes: ● All CPU sockets filled ● 6 DIMMs ● 2 storage drives ● 2 PCI cards ● 1 CD-RW/DVD-ROM drive ● 2 power supplies
RES-22XR3-S	23 lbs (10.4 kg)	2	17”	
RES-22XR3/FIO	25.3 lbs (11.5 kg)	2	16”	
RES-21XR3	22.5 lbs (10.2 kg)	1	17”	
RES-32XR3	28.5 lbs (12.9 kg)	2	20”	Includes: ● All CPU sockets filled ● 6 DIMMs ● 2 storage drives ● 2 PCI cards ● 1 CD-RW/DVD-ROM drive ● 2 power supplies
RES-32XR3-S	26.5 lbs (12.0 kg)	2	17”	
RES-32XR3/FIO	29.0 lbs (13.2 kg)	2	16”	
RES-31XR3	26 lbs (11.8 kg)	1	17”	

Installation Section

Chapter 2

Installation and Operation

This chapter describes:

- How to install a memory module, storage drive, PCI card, 120-mm-fan, power supply, and lithium battery.
- Rack-mount brackets
- How to turn the RES-32XR3 Configuration 3 on and off

2.1 Installation Procedures

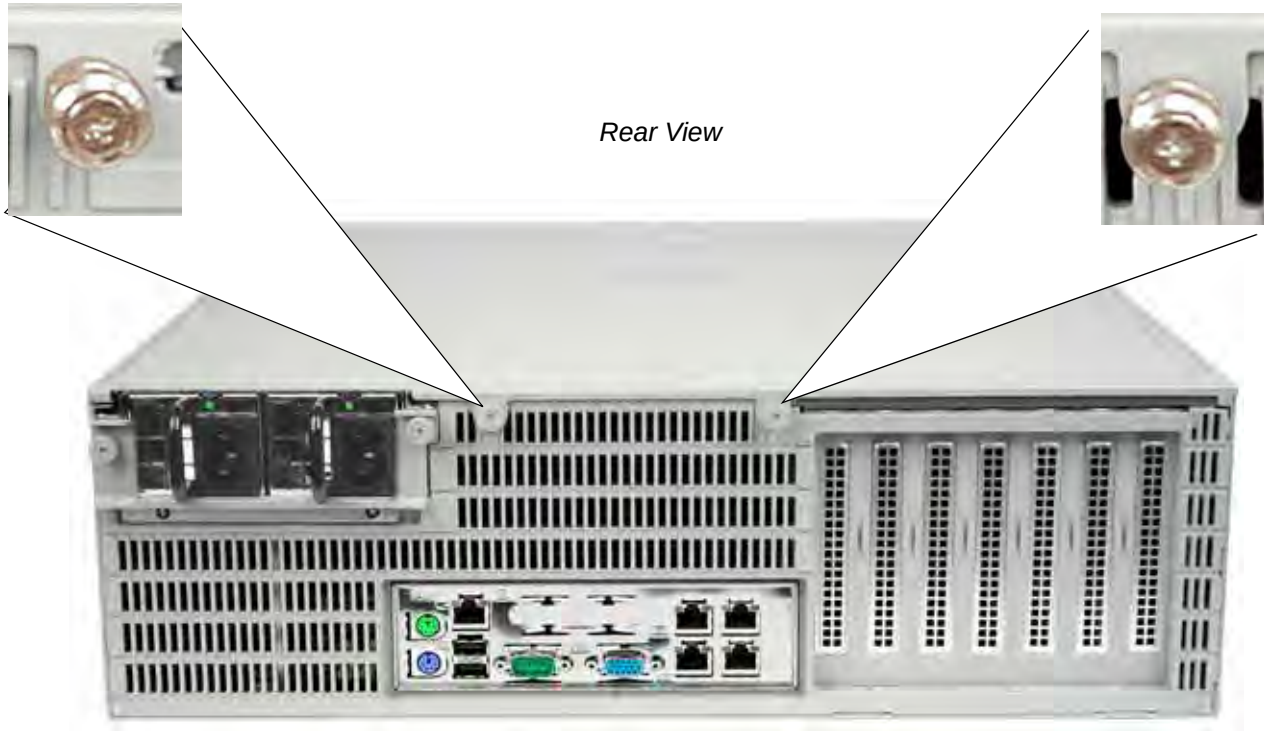
Caution: Use industry-standard ESD grounding techniques when handling all components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface. **Handle all IC cards by the front panel or edges only.**

To install or replace a **storage drive**, **fan**, or **power supply**, skip the next section and proceed directly to page 2-9, page 2-12, or page 2-13, respectively. Replacement of motherboard components requires removal of the protective cover.

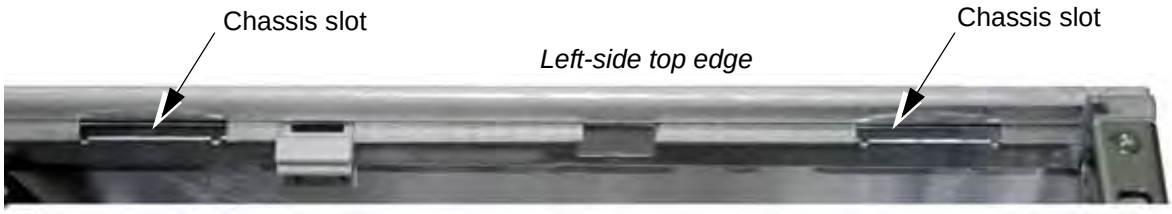
2.1.1 Remove Protective Top Cover

To access a motherboard component, open the RES-32XR3 as follows:

1. Loosen the two captive Phillips screws holding the protective top access cover to the rear of the RES-32XR3 Configuration 3 chassis (see **A**, *Figure 2-1*).
2. Both the front and sides of the cover have flat hooks or tabs underneath that fit under slots on the chassis top edges (see **B**, *Figure 2-1*). Remove the cover by sliding it toward the rear until it is free of these chassis slots.
3. Store the cover in a safe place until it is replaced.



A Loosen the 2 captive access-cover screws …



B … and slide the top cover toward the rear until the top hooks and tabs clear all chassis slots

Figure 2-1. Remove the RES-32XR3 Protective Access Cover

4. Proceed to the appropriate section to install or replace a **memory module** (page 2-3), **PCI card** (page 2-7), or **lithium battery** (page 2-8).

2.1.2 Memory Modules

The RES-32XR3 Configuration 3 supports memory according to *Table 2-1*. Note the total memory capacity varies according to the motherboard installed in the system.

Table 2-1. RES-32XR3 Configuration 3 Memory Capacity

Motherboard	Memory Parameters				
	Capacity	DDR3 Registered ECC	Speed (MHz)	Number of DIMMS	Pins per DIMM
X8DT3	192 GB	Yes	1333/1066/800	12	240
X8DT3-F	192 GB	Yes	1333/1066/800	12	240
X8DT3-LN4F	192 GB	Yes	1333/1066/800	12	240

Caution: Exercise extreme caution when installing or removing Memory Modules to prevent any possible damage.

Table 2-2. RES-32XR3 Configuration 3 Memory Population

DIMMs	CPU 1						CPU 2					
	Branch 0		Branch 1		Branch 3		Branch 0		Branch 1		Branch 3	
6 DIMMs	1A		2A		3A		1A		2A		3A	
12 DIMMs	1A	1B	2A	2B	3A	3B	1A	1B	2A	2B	3A	3B

When installing memory, follow these rules for best memory performance:

- It is strongly recommended that you *do not mix memory modules* of different speeds, sizes, and vendors.

2.1.2.1 Installation

The following procedure explains how to install the DDR3 Memory Modules.

1. Loosen and remove the seven screws securing the air-flow deflector in the following manner: (see *Figure 2-2*).
   - **Screw A**—After removing Screw A, remove the PCI card retainer bracket and store in a safe place.
   - **Screw B—**The screw marked “B” in *Figure 2-2* is recessed. Remove it with a long-shank magnetic Phillips screwdriver.

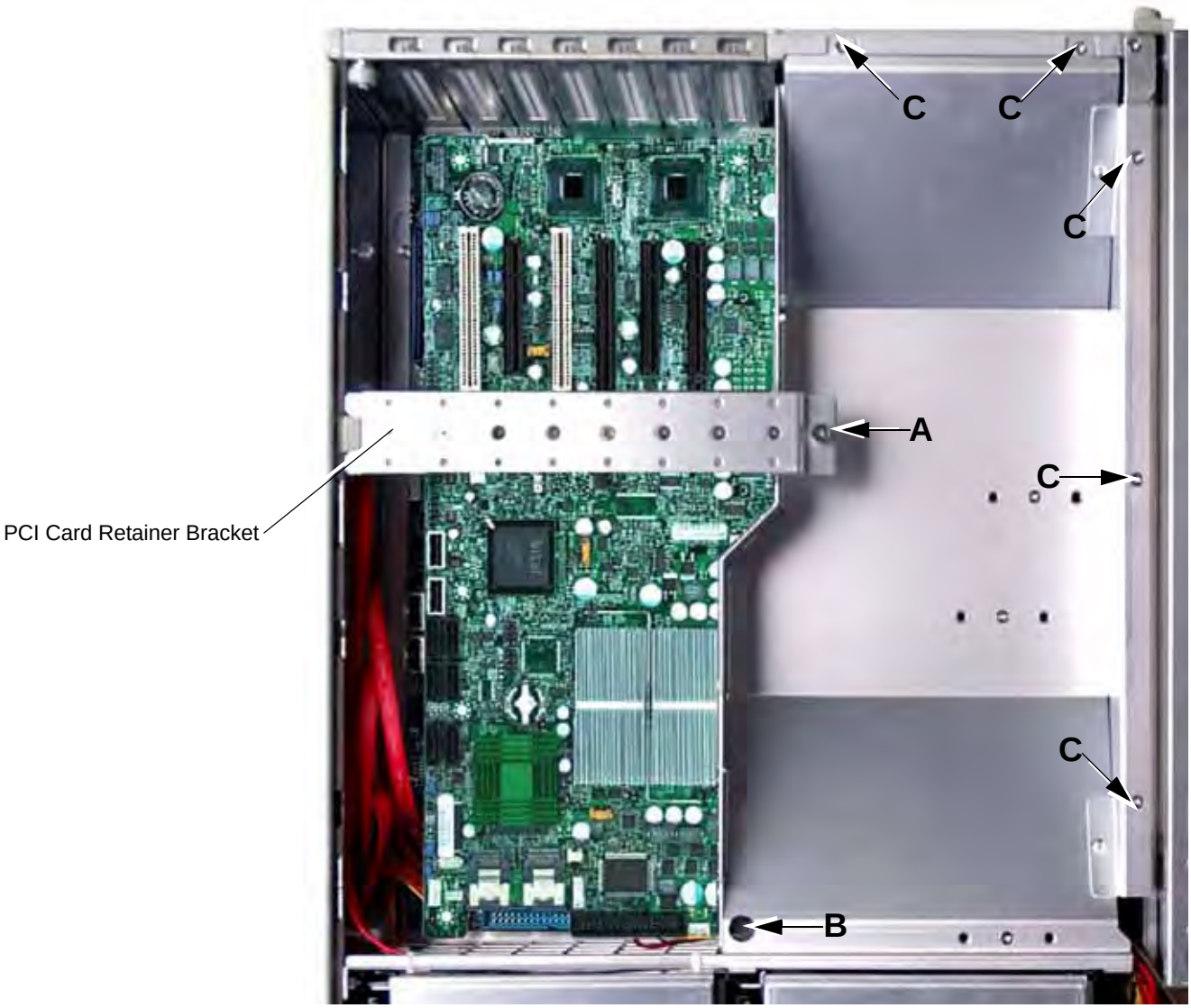


Figure 2-2. Remove Air-Flow Deflector Screws

- **Screw C—**Remove the five screws marked “C” in *Figure 2-2* on page 2-4, which will loosen the air-flow diverter so that it can be removed from the system. After the air-flow diverter has been removed, the memory module slots will be exposed (see *Figure 2-3*).

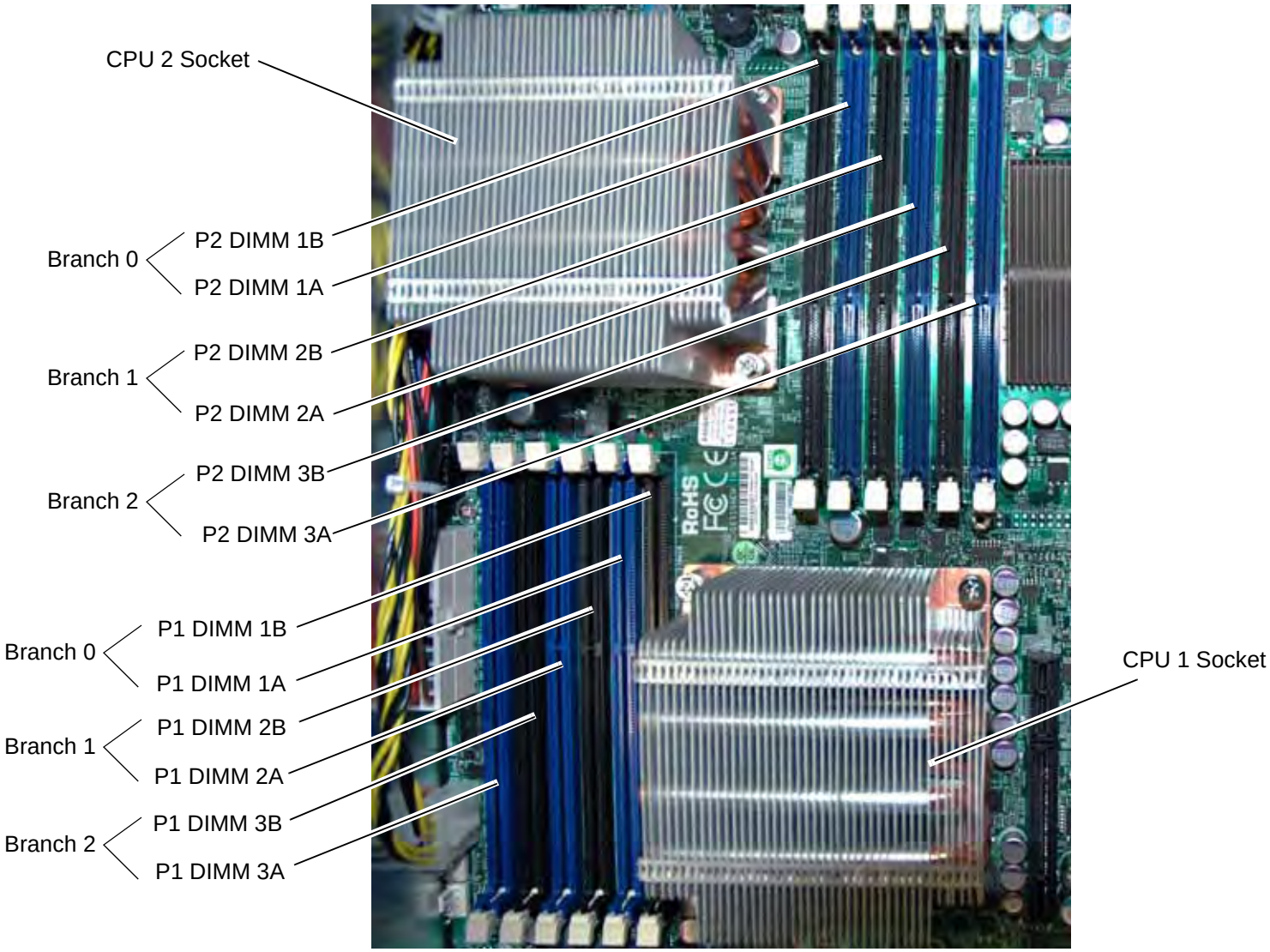


Figure 2-3. Memory Module Slot Locations

2. If a module is already seated in the slot you have selected for installation, remove it by gently pressing down and outward on the latches at both ends of the slot (see *Figure 2-4* on page 2-6), then pulling the old module directly up from the slot until it is free of the connector (see *Figure 2-4*).

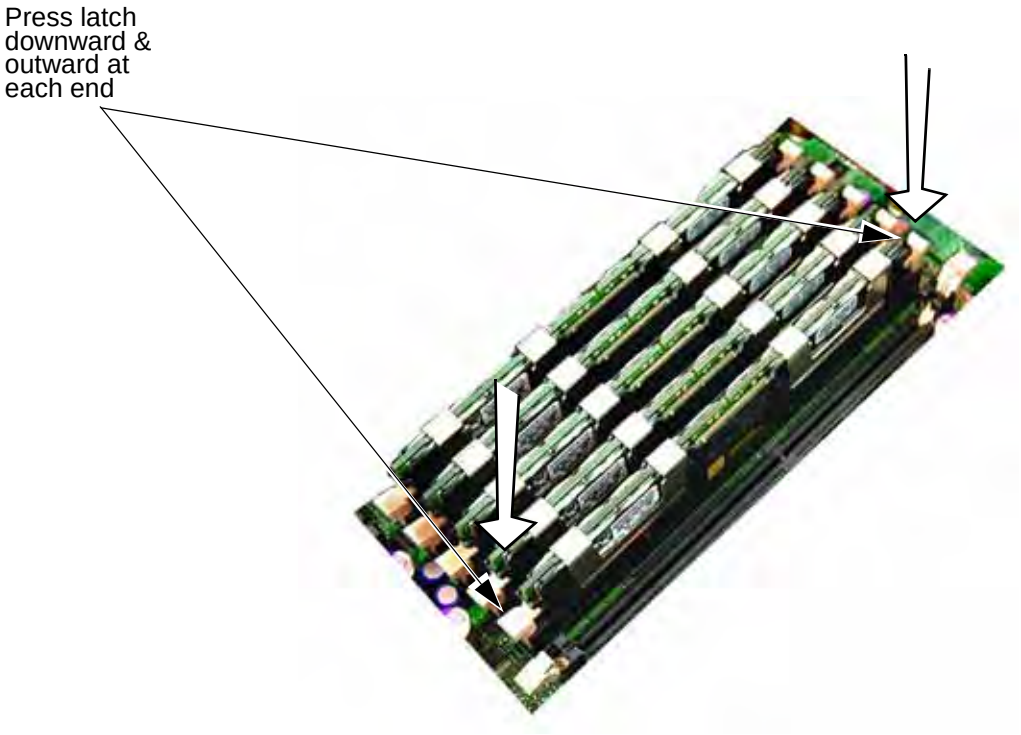


Figure 2-4. Memory Module Removal

3. Before inserting a new memory module into the vacant slot, make sure that the two latches are pulled outward away from the center of the slot.

With the latches in the outward position, gently insert the new module vertically into its slot and press firmly downward until it snaps into place.

Note: Make sure the memory module has the proper orientation by aligning the alignment notch at the bottom edge with its counterpart ridge at the bottom of the slot.

4. If all the memory modules have been replaced in the system, replace the air flow diverter and secure it with the six screws previously removed.

5. Replace the PCI card retainer bracket and secure it with the single screw removed in Step 1 on page 2-4.

6. If installation of motherboard components is completed, close the RES-32XR3 chassis by refastening the top cover removed in Section 2.1.1, “Remove Protective Top Cover”, on page 2-1.

2.1.3 PCI Cards

The RES-32XR3 Configuration 3 supports two 32-bit/33-MHz PCI slots, three x8 PCI-Express 2.0 slot (one in a x16 slot), and one x4 PCI-Express 2.0 slot (in a x8 slot). All slots support cards up to 12.28-inches long.

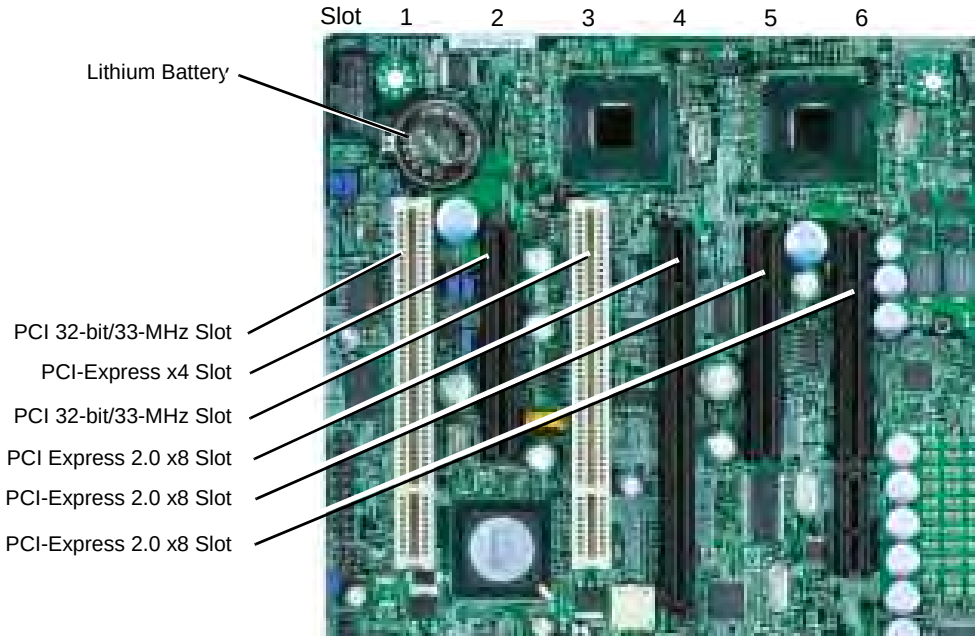
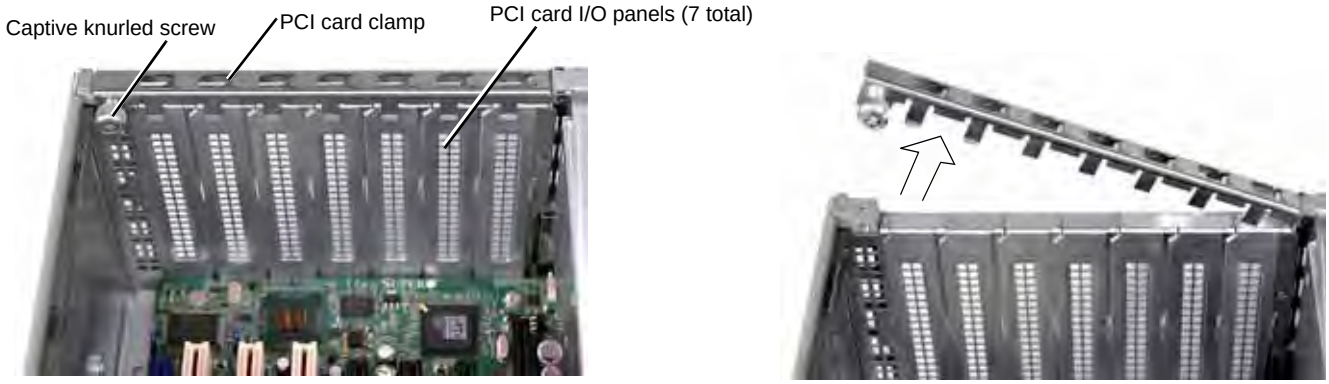


Figure 2-5. PCI Card Installation, RES-32XR3 Configuration 3

2.1.3.1 Installing Cards

Perform the following steps to install a PCI card:

1. Loosen the captive knurled screw on the PCI card clamp (see **A**, *Figure 2-6*).



A Loosen the captive knurled screw…

B … and swing the PCI card clamp upward.

Figure 2-6. PCI Card Clamp

2. Swing the PCI card clamp away from the top of the chassis, exposing the tops of the PCI card I/O panels (see **B**, *Figure 2-6*).
3. Locate the empty slot within which a card will be installed (see *Figure 2-5*).
4. Install the new card, making sure the I/O panel is aligned with the chassis opening.
5. Repeat Step 3 and Step 4 until all additional cards have been installed.
6. Swing the PCI card clamp back to its position over the PCI card I/O panels and tighten the captive knurled screw on the PCI card clamp.
7. Attach any internal I/O cables to the installed PCI cards, and carefully fold and tuck any exposed ribbon cables into the cabinet.
8. If you have no further installations to perform, close the RES-32XR3 chassis by refastening the top cover removed in Section 2.1.1, “Remove Protective Top Cover,” on page 2-1.

2.1.4 Lithium Battery

2.1.4.1 Removing the Lithium Battery

Perform the following steps to remove the lithium battery:

1. Make sure the system is powered off (see “Operation” on page 2-16).
2. Locate the lithium battery socket and squeeze the latch (see **A**, *Figure 2-7*) together until the battery lifts out of its socket.
3. Remove the old battery and replace with a new battery (see next section).

A To release, squeeze battery latch together… **B** … and remove battery from socket

Figure 2-7. The RES-32XR3 Configuration 3 Lithium Battery and Socket

Note: The battery location is dependent on which motherboard is installed in the chassis.

2.1.4.2 Installing a Lithium Battery

Perform the following steps to insert a new lithium battery:

1. Tilt the replacement battery into the empty socket so that it is angled under the battery latch (see **B**, *Figure 2-7* on page 2-8).
2. Carefully press down on the battery until it clicks firmly into place.

2.1.5 SAS/SATA II Storage Drive

Perform the following steps to remove and install a storage drive, which may be either SAS or SATA II. The front doors of the RES-32XR3 Configuration 3 must be unlocked and opened to access the storage drives (see *Figure 2-8*).

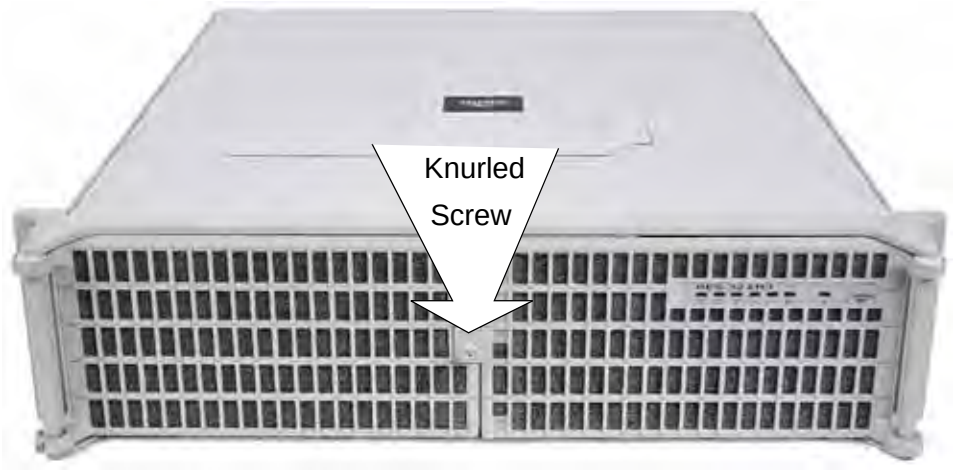


Figure 2-8. Opening the RES-32XR3 Configuration 3 Front (Bezel) Doors

Note: For SAS drives, the lower left-hand removable disk drive (SAS ID0) is designated as the boot drive. For SATA II drives, the upper left-hand removable disk drive (SATA II ID0) is designated as the boot drive.

2.1.5.1 Opening the RES-32XR3 Front Doors

The knurled captive screw on the front of the RES-32XR3 Configuration 3 allows the doors to lock without a key. To unlock the doors, turn the screw counterclockwise and pull both doors away from the chassis.

The accessory kit shipped with your RES-32XR3 contains two barrel lock keys. This provides you the option of unlocking/locking the storage drives (see *Figure 2-9*).

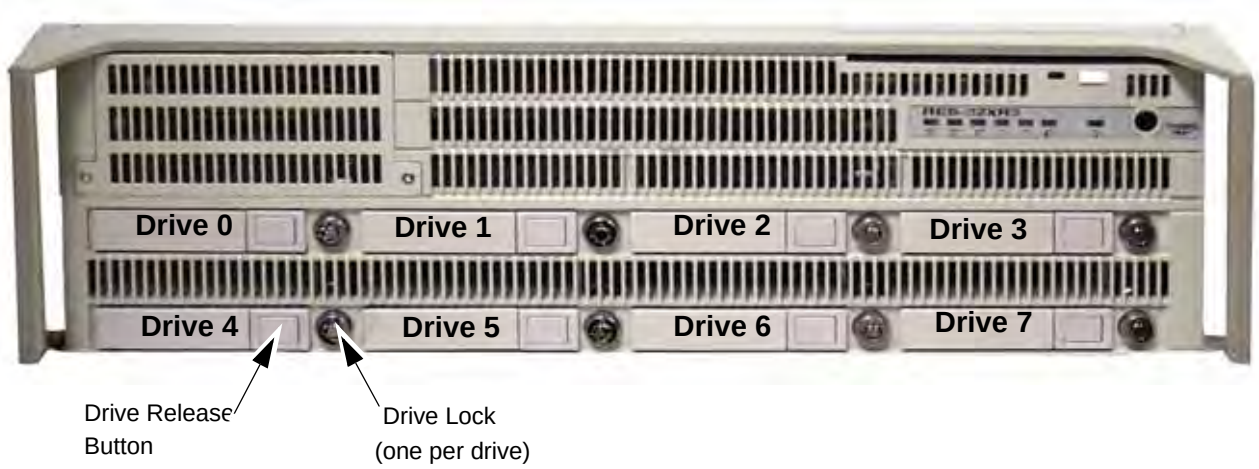


Figure 2-9. Unlocking the RES-32XR3 Storage Drives (Front Doors Removed)

2.1.5.2 Storage-Drive Removal

After opening the front bezel cover, perform the following steps to remove and install a storage drive:

1. Make sure the system is powered off (see “Operation” on page 2-16).
2. Locate the drive to be removed.
3. Insert the barrel lock key into the hard drive you want to remove, and turn it 45 degrees clockwise (presuming the disk drive is locked; see **A** in *Figure 2-10*, page 2-11).
4. Firmly push in the latch lock until the latch handle releases away from the drive (see **B** in *Figure 2-10*).
5. Grab the latch handle and pull the drive completely away from its slot (see **C** in *Figure 2-10*).

Caution: When pulling the storage drive from the chassis, hold it at the bottom to prevent it from falling and damaging the drive.

A Insert key into barrel lock and turn 45 degrees clockwise, …

B …push the latch lock,…

C … and pull drive out with the latch handle

Figure 2-10. RES-32XR3 Storage-Drive Removal

2.1.5.3 Storage-Drive Installation

To install a storage drive,

1. Make sure the latch handle of the drive to be installed is in the open position.
2. Properly orient the new drive and insert it into the vacant drive slot. If the drive cannot be inserted into the slot, rotate it 180 degrees.
3. Push the drive toward the rear (DO NOT CLOSE the latch handle while pushing) until the drive is flush with the front of the chassis. The handle will swing closed when it comes into contact with the RES-32XR3 chassis.
4. When the drive is fully inserted in its slot, insert the key into the barrel lock and turn it 45 degrees counter-clockwise. The drive is now locked.

Caution: When in the closed position, the latch handle secures the drive to the chassis. If the handle is closed before the drive is fully inserted, the latch mechanism may not fully engage to secure the drive.

2.1.6 Removable 120-mm Fan

The RES-32XR3 Configuration 3 contains two high-speed 120-mm fans. Both fans are removable for replacement in case of a fan failure.

Note: Since RES-32XR3 Configuration 3 fans are "hot-swappable", it is not necessary to turn off system power in order to remove and replace a fan,

2.1.6.1 Removing and Installing a 120-mm Fan

Perform the following steps to remove and install a 120-mm fan:

1. On the top cover of the chassis, push the fan lid lock left to unlock the fan lid (see *Figure 2-11*). Pull the fan lid upward exposing the two 120-mm fans.
2. Each fan is secured by a locking latch on the left hand side. To remove a fan, press the latch lock toward the center of the fan with the left hand index finger. With the right hand index finger, press on the right hand side of the fan and pull the fan directly upward from the RES-32XR3 chassis.

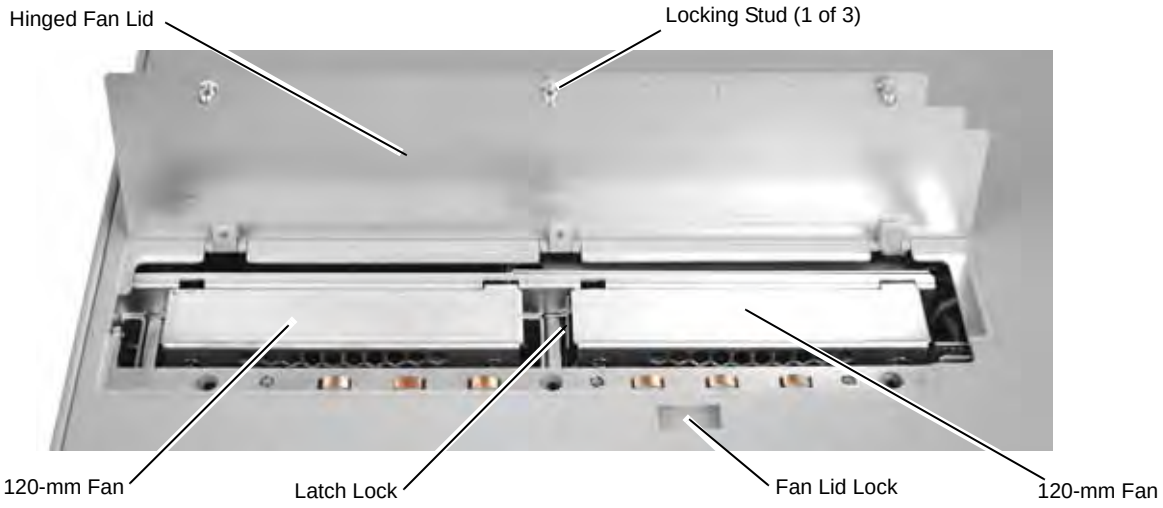


Figure 2-11. The RES-32XR3 Configuration 3 120-mm-Fans

3. When the fan is removed, its 4-wire connector will automatically disconnect from the chassis. Insert the replacement fan carefully into the empty fan slot until it is flush with the second fan. The 4-wire connector will automatically engage its counterpart connector successfully.

2.1.7 Power Supply

Each load-sharing (N+1 redundant) power supply can be hot-swapped while the system is still on and operational.

2.1.7.1 Removing a Power Supply

Perform the following steps to remove a power supply:

1. Remove the two captive Phillips screws holding the power supply locking bracket to the chassis. Store the bracket for later use (see **A** in *Figure 2-12*).

A Remove power supply locking bracket

B …then disengage locking lever and remove power supply

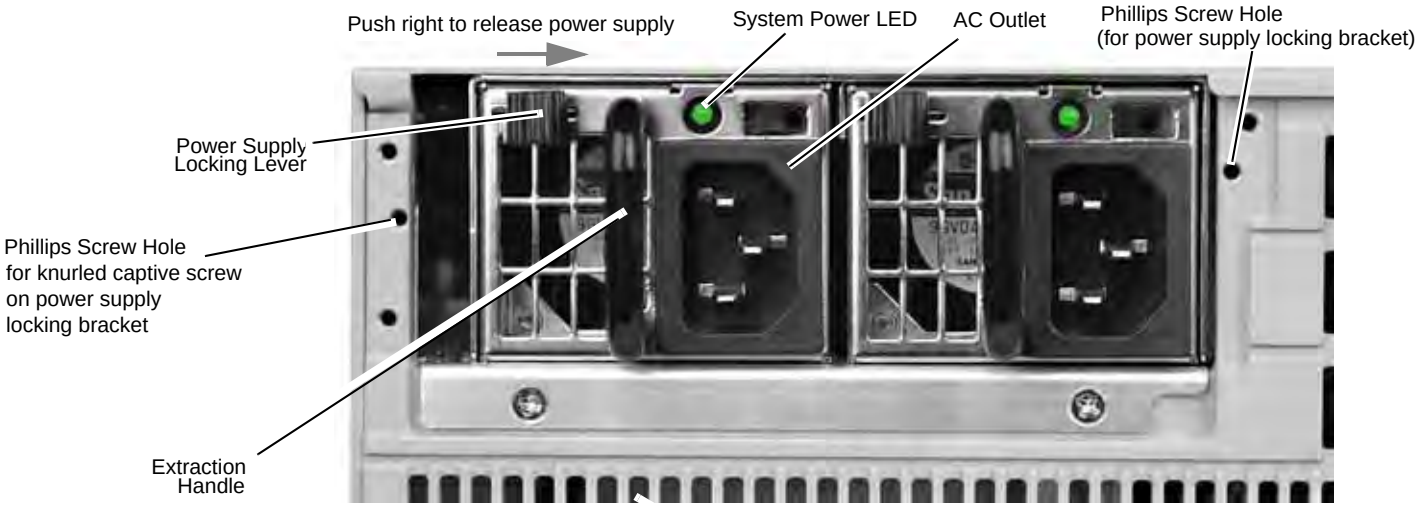


Figure 2-12. The RES-32XR3 Power Supply Locking Mechanism

2. Put the right index finger on the power supply extraction handle and the right thumb on the left side of the power supply locking lever.

3. Squeeze the locking lever toward the pull handle and firmly pull the power supply from the chassis.

Caution: When pulling the power supply from the chassis, hold it at the bottom to prevent it from falling and damaging the unit.

2.1.7.2 Installing a Power Supply

Perform the following steps to install a power supply:

1. Insert the replacement power supply into an empty slot with the extraction handle facing to the right and the power LED at the top (see *Figure 2-12* on page 2-13).

2. Push the power supply carefully into its slot until it is firmly seated (a click will be heard when the locking lever is securely fastened to the chassis).

3. Replace the power supply locking bracket and tighten the two captive Phillips screws (see *Figure 2-12*) to secure both power supplies.

2.2 Rack Mounts

2.2.1 Mounting Brackets

The rack-mount brackets (flanges) are used to secure the chassis to the 19” rack (see *Figure 2-13*). Handles are used to pull the RES-32XR3 from the rack when rack-mount slides have been installed on the sides of the chassis (see following section).

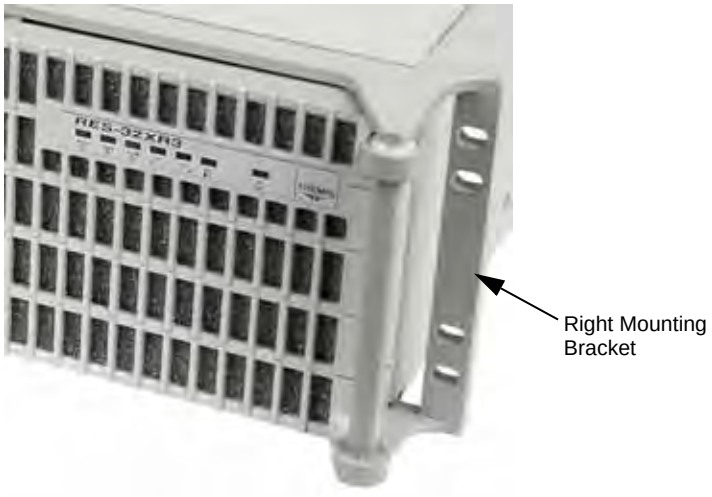


Figure 2-13. Right Rack-Mount Bracket

2.2.2 Rack-Mount Slides (Optional)

Rack-Mount Slides can be mounted on each side of the RES-32XR3 Configuration 3 for the purpose of sliding the unit in and out of a rack. Mounting slides are optional and should be ordered at the time your system is purchased.

To learn how to install rack-mount slides, refer to Appendix B, “Rack-Mount Slide Installation”.

Caution: Any screws used to mount a slide to a RES-32XR3 chassis must not exceed a length of 3/8” to prevent excessive penetration of the chassis.

2.3 Operation

2.3.1 Plugging in the AC Power Cords

Before powering on the RES-32XR3, plug in the AC power cords as follows:

1. On the rear of the RES-32XR3, plug an AC power cord (shipped with unit) into the AC power socket on each power supply (see *Figure 2-14*).

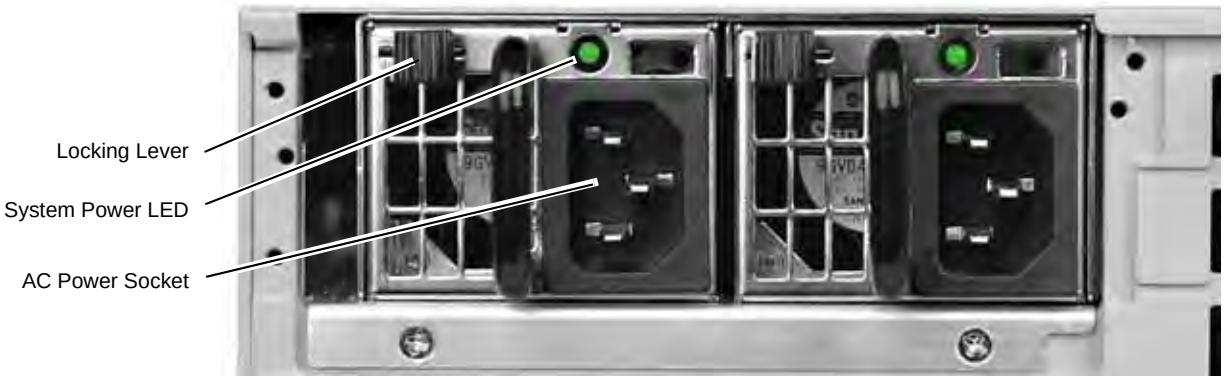


Figure 2-14. AC Power Socket and LED on the RES-32XR3 Configuration 3 Rear

2.3.2 Turning the System On

1. Plug the AC power cord from each of the RES-32XR3 Configuration 3 power supplies into a “live” AC outlet.
2. On the front of the RES-32XR3 push the system power on/off button (see *Figure 2-15*). This will cause the system `POWER` LED to light (green) as well as the power supply module LED to light (green).

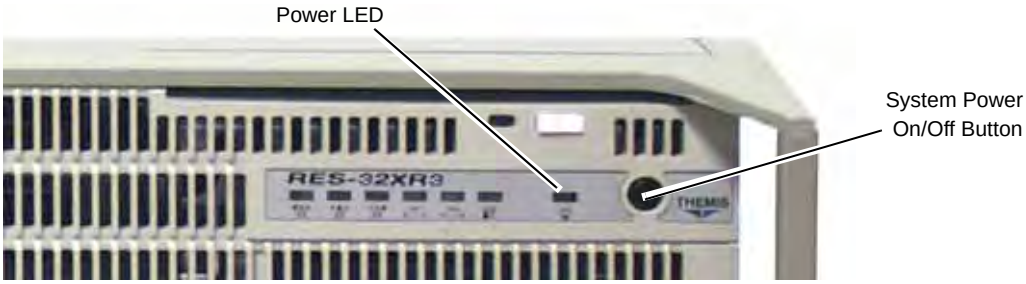


Figure 2-15. System Power Button and LED on the RES-32XR3 Front

2.3.3 Getting Started

2.3.3.1 Configuration

1. Make sure all storage drives are installed (see “SAS/SATA II Storage Drive” on page 2-9). Drive ID numbers are shown in *Figure 1-3* on page 1-4, Chapter 1. Changes may be made through the BIOS.
2. Make sure that a graphics card is installed in a PCI-*Express* slot (Configuration 3 motherboards have onboard graphics capability); see *Figure 2-5* on page 2-7) and connect a multiscan monitor to the SVGA or any other available connection type exist.
3. Attach a PS/2 keyboard and mouse to the appropriate connectors on the rear I/O panel of the RES-32XR3 Configuration 3 (see *Figure 1-5* on page 1-6)
4. Turn the system on (see previous section).

2.3.3.2 Linux Installation

The subject of installing the Linux operating system onto the RES-32XR3 is detailed in Appendix C, “Red Hat Enterprise Linux 5 Installation”.

2.3.4 Turning the System Off

Caution: Before turning your system off, make sure to save all open files, properly close applications, and broadcast a warning to all users on any active networks.

1. To turn the RES-32XR3 power off, press and hold the system power on/off button (see *Figure 2-15*, page 2-16) for at least four (4) seconds. This will shut down the system and turn off the `POWER` LED as well as the power supply module LED.

   As an alternative, a modern operating system (Windows 9x or newer and Linux, for example) can turn off the system after a graceful OS software shutdown.

Installation Section

Chapter 3

BIOS Setup Utility

3.1 Introduction

This chapter describes the AMI BIOS Setup Utility for the RES-32XR3 motherboards. The AMI ROM BIOS is stored in a Flash EEPROM and can be easily updated. This chapter describes the basic navigation of the AMI BIOS Setup Utility setup screens.

3.1.1 Starting BIOS Setup Utility

To enter the AMI BIOS Setup Utility screens, press the <Delete> key while the system is booting up.

Note: In most cases, the <Delete> key is used to invoke the AMI BIOS setup screen. There are a few cases when other keys are used, such as <F1>, <F2>, etc.

Each main BIOS menu option is described in this manual. The Main BIOS setup menu screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured. Options in blue can be configured by the user. The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it

.

Note: The AMI BIOS has default text messages built in. Supermicro retains the option to include, omit, or change any of these text messages.

The AMI BIOS Setup Utility uses a key-based navigation system called “hot keys”. Most of the AMI BIOS setup utility “hot keys” can be used at any time during the setup navigation process. These keys include <F1>, <F10>, <Enter>, <ESC>, arrow keys, etc.

Note: Options printed in **Bold** are default settings.

3.1.2 How To Change the Configuration Data

The configuration data that determines the system parameters may be changed by entering the AMI BIOS Setup utility. This Setup utility can be accessed by pressing <Del> at the appropriate time during system boot.

3.1.3 Starting the Setup Utility

Normally, the only visible Power-On Self-Test (POST) routine is the memory test. As the memory is being tested, press the <Delete> key to enter the main menu of the AMI BIOS Setup Utility. From the main menu, you can access the other setup screens. An AMI BIOS identification string is displayed at the left bottom corner of the screen below the copyright message.

Caution: Do not upgrade the BIOS unless your system has a BIOS-related issue. Flashing the wrong BIOS can cause irreparable damage to the system. In no event shall Supermicro be liable for direct, indirect, special, incidental, or consequential damages arising from a BIOS update. If you have to update the BIOS, do not shut down or reset the system while the BIOS is updating. This is to avoid possible boot failure.

3.2 Main Setup

When you first enter the AMI BIOS Setup Utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab on the top of the screen. The Main BIOS Setup screen is shown below.

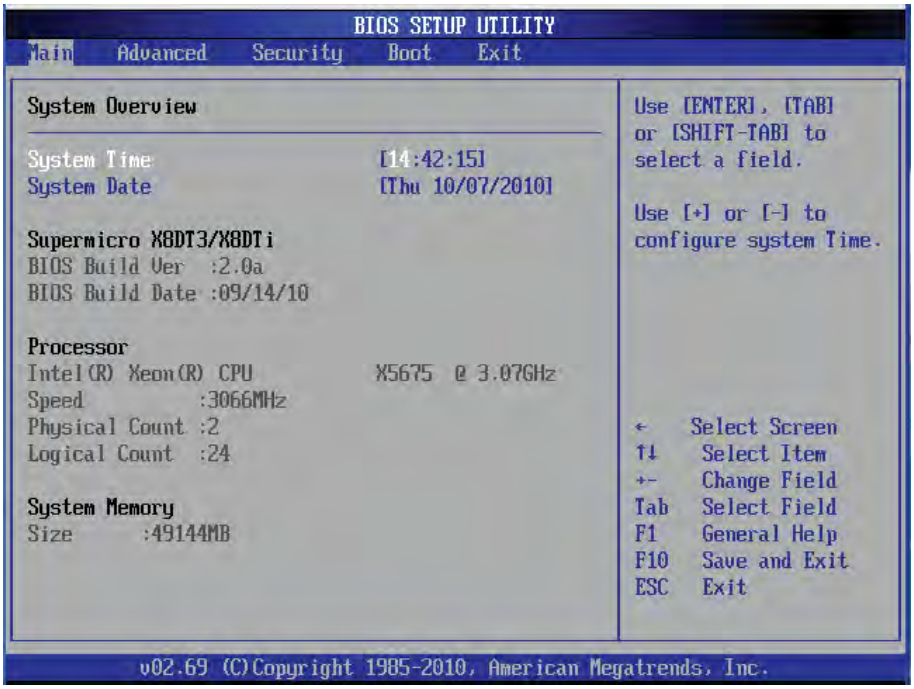


Figure 3-1. Main BIOS Setup Screen

3.2.1 System Overview

The following BIOS information will be displayed:

3.2.1.1 System Time/System Date

Use this option to change the system time and date. Highlight *System Time* or *System Date* using the arrow keys. Enter new values through the keyboard and press <Enter>. Press the <Tab> key to move between fields. The date must be entered in Day MM/DD/YY format. The time is entered in HH:MM:SS format.

Note: The time is in the 24-hour format. For example, 5:30 P.M. appears as 17:30:00.).

3.2.1.2 Supermicro X8DTi

- BIOS Build Version: This item displays the BIOS revision used in your system.
- BIOS Build Date: This item displays the date when this BIOS was completed.
- AMI BIOS Core Version: This item displays the revision number of the AMI BIOS Core upon which your BIOS was built.

3.2.1.3 Processor

The AMI BIOS will automatically display the status of the processor used in your system:

- CPU Type: This item displays the type of CPU used in the motherboard.
- Speed: This item displays the speed of the CPU detected by the BIOS.
- Physical Count: This item displays the number of processors installed in your system as detected by the BIOS.
- Logical Count: This item displays the number of CPU Cores installed in your system as detected by the BIOS.

3.2.1.4 System Memory

This displays the size of memory available in the system:

- Size: This item displays the memory size detected by the BIOS.

3.3 Advanced Setup Configurations

Use the arrow keys to select Boot Setup and hit <Enter> to access the submenu items:

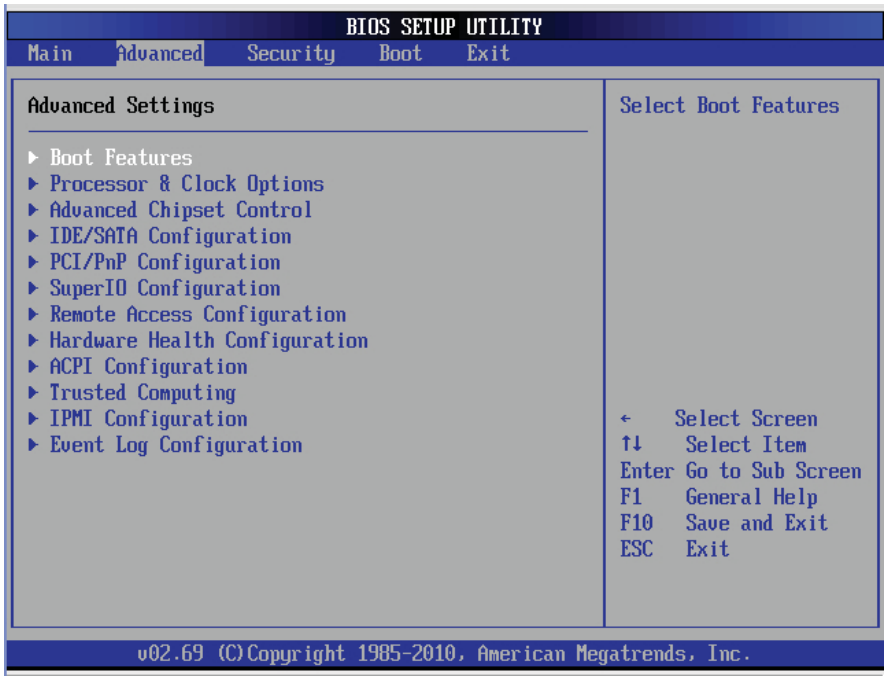


Figure 3-2. Advanced Settings Screen

3.3.1 BOOT Features

3.3.1.1 Quick Boot

If Enabled, this option will skip certain tests during POST to reduce the time needed for system boot. The options are **Enabled** (default) and Disabled.

3.3.1.2 Quiet Boot

This option allows the bootup screen options to be modified between POST messages or the OEM logo. Select Disabled to display the POST messages. Select Enabled to display the OEM logo instead of the normal POST messages. The options are **Enabled** (default) and Disabled.

3.3.1.3 AddOn ROM Display Mode

This sets the display mode for the Option ROM. Select Keep Current to use the current AddOn ROM Display setting. Select Force BIOS to use the Option ROM display mode set by the system BIOS. The options are **Force BIOS** (default) and Keep Current.

3.3.1.4 Bootup Num-Lock

This feature selects the Power-on state for Numlock key. The options are Off and **On** (default).

3.3.1.5 Wait For 'F1' If Error

This forces the system to wait until the 'F1' key is pressed if an error occurs. The options are Disabled and **Enabled** (default).

3.3.1.6 Hit 'Del' Message Display

This feature displays “Press DEL to run Setup” during POST. The options are **Enabled** (default) and Disabled.

3.3.1.7 Interrupt 19 Capture

Interrupt 19 is the software interrupt that handles the boot disk function. When this item is set to Enabled, the ROM BIOS of the host adaptors will “capture” Interrupt 19 at boot and allow the drives that are attached to these host adaptors to function as bootable disks. If this item is set to Disabled, the ROM BIOS of the host adaptors will not capture Interrupt 19, and the drives attached to these adaptors will not function as bootable devices. The options are **Enabled** (default) and Disabled.

3.3.2 Power Configuration

3.3.2.1 Power Button Function

If set to Instant_Off, the system will power off immediately as soon as the user hits the power button. If set to 4_Second_Override, the system will power off when the user presses the power button for 4 seconds or longer. The options are **Instant_Off** (default) and 4_Second_Override.

3.3.2.2 Restore on AC Power Loss

Use this feature to set the power state after a power outage. Select Power-Off for the system power to remain off after a power loss. Select Power-On for the system power to be turned on after a power loss. Select Last State to allow the system to resume its last state before a power loss. The options are Power-On, Power-Off and **Last State** (default).

3.3.2.3 Watch Dog Timer

If enabled, the Watch Dog Timer will allow the system to reboot when it is inactive for more than 5 minutes. The options are Enabled and **Disabled** (default)**.**

3.3.3 Processor and Clock Options

This submenu allows the user to configure the Processor and Clock settings.

3.3.3.1 Ratio CMOS Setting

This option allows the user to set the ratio between the CPU Core Clock and the FSB Frequency. The default setting is the maximum ratio allowed for the type of CPU installed in the system.

Note: If an invalid ratio is entered, the AMI BIOS will restore the setting to the previous state. The Ratio CMOS settings differ, depending on the type of CPU installed in the system.

3.3.3.2 C1E Support

Select Enabled to use the feature of Enhanced Halt State. C1E significantly reduces the CPU's power consumption by reducing the CPU's clock cycle and voltage during a “Halt State.” The options are Disabled and **Enabled** (default).

3.3.3.3 Hardware Prefetcher (Available when supported by the CPU)

If set to Enabled, the hardware prefetcher will prefetch streams of data and instructions from the main memory to the L2 cache in the forward or backward manner to improve CPU performance. The options are Disabled and **Enabled** (default).

3.3.3.4 Adjacent Cache Line Prefetch (Available when supported by the CPU)

The CPU prefetches the cache line for 64 bytes if this option is set to Disabled. The CPU prefetches both cache lines for 128 bytes as comprised if **Enabled** (default).

3.3.3.5 MPS and ACPI MADT Ordering

This feature is used to configure the MPS (Multi-Processor Specifications) and ACPI settings for the motherboard. Select Modern Ordering if Windows XP or newer is used in the motherboard. Select Legacy Ordering if Windows 2000 or older is used. The options are Modern Ordering (default) and Legacy Ordering.

3.3.3.6 Max CPUID Value Limit

This feature is used to set the maximum CPU ID value. Enable this function to boot the legacy operating systems that cannot support processors with CPUID functions. The options are Enabled and **Disabled** (default)(for the Windows OS).

3.3.3.7 Intel® Virtualization Technology (Available when supported by the CPU)

Select Enabled to use the feature of Virtualization Technology to allow one platform to run multiple operating systems and applications in independent partitions, creating multiple “virtual” systems in one physical computer. The options are **Enabled** (default) and Disabled.

Note: If there is any change to this setting, you will need to power off and restart the system for the change to take effect. Please refer to Intel’s website for detailed information.

3.3.3.8 Execute-Disable Bit Capability (Available when supported by the OS and the CPU)

Set to Enabled to enable the Execute Disable Bit support which will allow the processor to designate areas in the system memory where an application code can execute and where it cannot, thus preventing a worm or a virus from flooding illegal codes to overwhelm the processor or damage the system during an attack. The default is **Enabled** (default). (Refer to Intel and Microsoft Web Sites for more information.)

3.3.3.9 Intel AES-NI (Available when supported by the OS and the CPU)

If set to Enabled, Intel AES-NI will add new encryption features to help accelerate AES SW application, providing code authorization and signature verification to enhance system security. The default is **Disabled**. (Refer to Intel and Microsoft web-sites for more information.)

3.3.3.10 Simultaneous Multi-Threading (Available when supported by the CPU)

Set to Enabled to use the Simultaneous Multi-Threading Technology, which will result in increased CPU performance. The options are Disabled and **Enabled** (default)**.**

3.3.3.11 Active Processor Cores

Set to Enabled to use a processor's Second Core and beyond. (Please refer to Intel's web site for more information.) The options are **All** (default)**,** 1 and 2.

3.3.3.12 Intel® EIST™ Technology

EIST (Enhanced Intel SpeedStep Technology) allows the system to automatically adjust processor voltage and core frequency in an effort to reduce power consumption and heat dissipation. Please refer to Intel’s web site for detailed information. The options are Disable (Disable GV3) and **Enable (Enable GV3)** (default).

3.3.3.13 Intel® Turbo Boost

Select Enabled to use the Turbo Mode to boost system performance. The options are **Enabled** (default) and Disabled.

3.3.3.14 Performance/Watt Select

Select Power Optimized to use the Turbo Boost mode after the system has been in the P0 state for more than 2 seconds. Select Traditional to use the Turbo Boost mode when the system has been in the P0 state less than 2 seconds. The options are Power Optimized and **Traditional** (default).

3.3.3.15 Intel® C-STATE Tech

If enabled, C-State is set by the system automatically to either C2, C3 or C4 state. The options are Disabled and **Enabled** (default).

3.3.3.16 C State package Limit Setting (Available when C-State support is enabled)

If this option is set to Auto, the AMI BIOS will automatically set the limit on the C-State package register. The options are **Auto** (default), C1, C3, C6, C7.

3.3.3.17 C1 Auto Demotion

When this item is set to enabled, the CPU will conditionally demote C3, C6 or C7 requests to C1 based on un-core auto-demote information. The options are Disabled and **Enabled** (default)

3.3.3.18 C3 Auto Demotion

When this item is set to enabled, the CPU will conditionally demote C6 or C7 requests to C3 based on un-core auto-demote information. The options are Disabled and **Enabled** (default).

3.3.3.19 Clock Spread Spectrum

Select Enable to use the feature of Clock Spectrum, which will allow the BIOS to monitor and attempt to reduce the level of Electromagnetic Interference caused by the components whenever needed. The options are **Disabled** (default) and Enabled.

3.3.4 Advanced Chipset Control

The items included in the Advanced Settings submenu are listed below:

CPU Bridge Configuration

3.3.4.1 QPI Links Speed

This feature selects QPI's data transfer speed. The options are Slow-mode, and **Full Speed** (default).

3.3.4.2 QPI Frequency

This selects the desired QPI frequency. The options are **Auto** (default), 4.800 GT, 5.866GT, 6.400 GT.

3.3.4.3 QPI L0s and L1

This enables the QPI power state to low power. L0s and L1 are automatically selected by the motherboard. The options are **Disabled** (default) and Enabled.

3.3.4.4 Memory Frequency

This feature forces a DDR3 frequency slower than what the system has detected. The available options are **Auto** (default), Force DDR-800, Force DDR-1066, Force DDR-1333.

3.3.4.5 Memory Mode

The options are **Independent** (default), Channel Mirror, and Lockstep.

- Independent - All DIMMs are available to the operating system.
- Channel Mirror - The motherboard maintains two identical copies of all data in memory for redundancy.
- Lockstep - The motherboard uses two areas of memory to run the same set of operations in parallel.

3.3.4.6 Demand Scrubbing

A memory error-correction scheme where the Processor writes corrected data back into the memory block from where it was read by the Processor. The options are Enabled and **Disabled** (default).

3.3.4.7 Patrol Scrubbing

A memory error-correction scheme that works in the background looking for and correcting resident errors. The options are **Enabled** (default) and **Disabled**.

3.3.4.8 Throttling - Closed Loop

Throttling improves reliability and reduces power in the processor by automatic voltage control during processor idle states. Available options are Disabled and **Enabled** (default).

3.3.5 Northbridge Configuration

This feature allows the user to configure the settings for the Intel Northbridge chip.

3.3.5.1 Intel I/OAT

The Intel I/OAT (I/O Acceleration Technology) significantly reduces CPU overhead by leveraging CPU architectural usage, freeing the system resource for other tasks. The options are Disabled and **Enabled** (default)

Note: A TOE device is a specialized, dedicated processor that is installed on an add-on card or a network card to handle some or all packet processing of this add-on card.

3.3.5.2 DCA (Direct Cache Access)

Select Enabled to use Intel's DCA (Direct Cache Access) Technology to improve data transfer efficiency. The options are Enabled and **Disabled** (default).

3.3.5.3 DCA Prefetch Delay

A DCA Prefetch is used with TOE components to prefetch data on order to shorten execution cycles and maximize data processing efficiency. Prefetching too frequently can saturate the cache directory and delay necessary cache accesses. This feature reduces or increases the frequency in which the system prefetches data. The options are [8], [16], [24], **[32]** (default), [40], [48], [56], [64], [72], [80], [88], [96], [104], [112], and [120].

3.3.5.4 IOH PCI-E Max Payload Size

Some add-on cards perform faster with the coalesce feature, which limits the payload size to 128B; while others, with a payload size of 256B which inhibits the coalesce feature. Please refer to your add-on card user guide for the desired setting. The options are **256B** (default) and 128B.

3.3.5.5 Intel VT-d

Select Enabled to enable Intel's Virtualization Technology support for Direct I/O VT-d by reporting the I/O device assignments to VMM through the DMAR ACPI Tables. This feature offers fully-protected I/O resource-sharing across the Intel platforms, providing the user with greater reliability, security and availability in networking and data-sharing. The settings are Enabled and **Disabled** (default).

3.3.5.6 Active State Power-Management

Select Enabled to use the power management for signal transactions between the PCI Express L0 and L1 Links. Select Enabled to configure PCI-E L0 and L1 Link power states. The options are **Disabled** (default) and Enabled.

3.3.6 Southbridge Configuration

This feature allows the user to configure the settings for the Intel ICH Southbridge chipset.

3.3.6.1 USB Functions

Select Enabled to use onboard USB connections. The Options are Disabled and **Enabled** (default).

3.3.6.2 Legacy USB Support

Select Enabled to use Legacy USB devices. If this item is set to Auto, Legacy USB support will be automatically enabled if a legacy USB device is installed on the motherboard. The settings are Disabled, **Enabled** (default), and Auto.

3.3.6.3 USB 2.0 Controller (Available when USB Functions is set to Disabled)

This feature displays the current USB controller used in the motherboard. The settings are Disabled, and **Enabled** (default).

3.3.6.4 USB 2.0 Controller Mode

This setting allows you to select the USB 2.0 Controller mode. The options are **Hi-Speed (480 Mbps**) (default) and Full Speed (12 Mbps).

3.3.6.5 BIOS EHCI Hand-Off

Select Enabled to enable BIOS Enhanced Host Controller Interface support to provide a workaround solution for an operating system that does not have EHCI Hand-Off support. When enabled, the EHCI Interface will be changed from the BIOS-controlled to the OS-controlled. The options are Disabled and **Enabled** (default).

3.3.6.6 Reserved Page Rout

Select PCI to use PCI communication mode for the USB connections. Select LPC to use LPC mode for the USB connections. The options are **PCI** (default) and LPC.

3.3.7 IDE/SATA Configuration

When this submenu is selected, the AMI BIOS automatically detects the presence of the IDE devices and displays the following items:

3.3.7.1 SATA#1 Configuration

If Compatible is selected, it sets SATA#1 to legacy compatibility mode, while selecting Enhanced sets SATA#1 to native SATA mode. The options are Disabled, Compatible, and **Enhanced** (default).

Configure SATA#1 as

This feature allows the user to select the drive type for SATA#1. Select RAID (Intel) to enable Intel's SATA RAID firmware to configure Intel's SATA RAID settings. Select RAID (Adaptec) to enable Adaptec's SATA RAID firmware to configure Adaptec's SATA RAID settings. Select AHCI to enable SATA Advanced Host Interface.

Caution: Take caution when using this function. This feature is for advanced programmers only.

The options are **IDE** (default)**,** RAID (Intel), RAID (Adaptec) and AHCI.

3.3.7.2 SATA#2 Configuration

Selecting Enhanced will set SATA#2 to native SATA mode. The options are Disabled, and **Enhanced** (default).

3.3.7.3 Primary IDE Master / Slave, Secondary IDE Master / Slave, Third IDE Master, and Fourth IDE Master

These settings allow the user to set the parameters of Primary IDE Master/Slave, Secondary IDE Master/Slave, Third and Fourth IDE Master slots. Hit <Enter> to activate the following submenu screen for detailed options of these items. Set the correct configurations accordingly. The items included in the submenu are:

Type

Select the type of device connected to the system. The options are Not Installed, **Auto** (default), CD/DVD and ARMD.

LBA / Large Mode

LBA (Logical Block Addressing) is a method of addressing data on a storage drive. In the LBA mode, the maximum drive capacity is 137 GB. For drive capacities over 137 GB, your system must be equipped with a 48-bit LBA mode addressing. If not, contact your manufacturer or install an ATA/133 IDE controller card that supports 48-bit LBA mode. The options are Disabled and **Auto** (default).

Block (Multi-Sector Transfer)

Block Mode boosts the IDE drive performance by increasing the amount of data transferred. Only 512 bytes of data can be transferred per interrupt if Block Mode is not used. Block Mode allows transfers of up to 64 KB per interrupt. Select Disabled to allow data to be transferred from and to the device one sector at a time. Select Auto to allow data transfer from and to the device occur multiple sectors at a time if the device supports it. The options are **Auto** (default) and Disabled.

PIO Mode

The IDE PIO (Programmable I/O) Mode programs timing cycles between the IDE drive and the programmable IDE controller. As the PIO mode increases, the cycle time decreases. The options are **Auto** (default), 0, 1, 2, 3, and 4.

Select Auto to allow the AMI BIOS to automatically detect the PIO mode. Use this value if the IDE storage drive support cannot be determined.

Select 0–4 to allow the AMI BIOS to use PIO mode 0–4. It has a data transfer rate of 3.3MB/s–16.6MB/s. See Below.

Table 3-1. PIO Mode Select Options

Option Selected	PIO Mode	Max. Transfer Rate
0	PIO Mode 0	3.3 MB/s
1	PIO Mode 1	5.2 MB/s
2	PIO Mode 2	8.3 MB/s
3	PIO Mode 3	11.1 MB/s
4	PIO Mode 4	16.6 MB/s

DMA Mode

Select Auto to allow the BIOS to automatically detect IDE DMA mode when the IDE storage drive support cannot be determined. The options are Auto, SWDMAn, MWDMAn, and UDMAn. See below for DMA Mode Select Options.

Table 3-2. DMA Mode Select Options

Option Selected	DMA Mode	Max. Transfer Rate
SWDMA 0	Single-Word DMA 0	2.1 MB/s
SWDMA 1	Single-Word DMA 1	4.2 MB/s
SWDMA 2	Single-Word DMA 2	8.3 MB/s
MWDMA 0	Multi-Word DMA 0	4.2 MB/s
MWDMA 1	Multi-Word DMA 1	13.3 MB/s
MWDMA 2	Multi-Word DMA 2	16.6 MB/s
UDMA 0	Ultra DMA 0	16.6 MB/s
UDMA 1	Ultra DMA 1	25 MB/s
UDMA 2	Ultra DMA 2	33.3 MB/s
UDMA 3	Ultra DMA 3	44.4 MB/s
UDMA 4	Ultra DMA 4	66.6 MB/s
UDMA 5	Ultra DMA 5	100 MB/s
UDMA 6	Ultra DMA 6	133 MB/s

S.M.A.R.T. For Storage drives

Self-Monitoring Analysis and Reporting Technology (SMART) can help predict impending drive failures. Select Auto to allow the AMI BIOS to automatically detect storage drive support. Select Disabled to prevent the AMI BIOS from using the S.M.A.R.T. Select Enabled to allow the AMI BIOS to use the S.M.A.R.T. to support storage drive disk. The options are Disabled, Enabled, and **Auto** (default).

32 Bit Data Transfer

Select Enable to enable the function of 32-bit IDE data transfer. The options are **Enabled** (default) and Disabled.

3.3.7.4 IDE Detect Timeout (sec)

Use this feature to set the time-out value for the BIOS to detect the ATA, ATAPI devices installed in the system. The options are 0 (sec), 5, 10, 15, 20, 25, 30, and **35** (default).

3.3.8 PCI/PnP Configuration

3.3.8.1 Clear NVRAM

This feature clears the NVRAM during system boot. The options are **No** (default) and Yes.

3.3.8.2 Plug & Play OS

Selecting Yes allows the OS to configure Plug & Play devices. (This is not required for system boot if your system has an OS that supports Plug & Play.) Select **No** (default) to allow the AMI BIOS to configure all devices in the system.

3.3.8.3 PCI Latency Timer

This feature sets the latency Timer of each PCI device installed on a PCI bus. Select 64 to set the PCI latency to 64 PCI clock cycles. The options are 32, **64** (default), 96, 128, 160, 192, 224 and 248.

3.3.8.4 PCI IDE Bus Master

When enabled, the BIOS uses PCI bus mastering for reading/writing to IDE drives. The options are Disabled and **Enabled** (default)**.**

3.3.8.5 SR-IOV Supported

Select Enabled to enable Single Root I/O Virtualization (SR-IOV) support that works in conjunction with the Intel Virtualization Technology and allow multiple operating systems running simultaneously within a single computer via natively sharing PCI-Express devices in order to enhance network connectivity and performance. The options are Enabled and **Disabled** (default).

3.3.8.6 Slot 1 Option ROM~Slot 6 Option ROM

Select Enabled to enable Slot 1 Option ROM~Slot 6 Option ROM, which will allow you to boot the computer from a PCI device installed on a PCI slot. The options are Disabled and **Enabled** (default).

3.3.8.7 Onboard LAN Options ROM Select

This feature allows the user to select the onboard LAN Option ROM type. The options are iSCSI and **PXE** (default).

3.3.8.8 LAN1 Option ROM/LAN2 Options ROM/LAN3 Option ROM/LAN4 Option ROM

Select Enabled to enable the onboard LAN1, LAN2, LAN3, or LAN4 ROM. This is to boot the computer using a network interface. The options are **Enabled** (default) and Disabled.

3.3.9 Super IO Device Configuration

3.3.9.1 Onboard Floppy Controller

Select Enable to enable the onboard Floppy Controller. The options are **Enabled** (default) and Disabled.

3.3.9.2 Floppy A

This feature allows the user to select the type of floppy drive connected to the system as specified. The options are Disabled, 360KB 5 1/4”, 1.2MB 5 1/4”, 720KB 3 1/2”, 1.44MB 3 1/2” and 2.88MB 3 1/2”. The default setting for Floppy A is **1.44MB 3 1/2”** (default)**.**

3.3.9.3 Serial Port1 Address/ Serial Port2 Address

This option specifies the base I/O port address and the Interrupt Request address of Serial Port 1 and Serial Port 2. Select Disabled to prevent the serial port from accessing any system resources. When this option is set to Disabled, the serial port physically becomes unavailable. Select 3F8/IRQ4 to allow the serial port to use 3F8 as its I/O port address and IRQ 4 for the interrupt address. The options for Serial Port1 are Disabled, **3F8/IRQ4** (default), 3E8/IRQ4, 2E8/IRQ3. The options for Serial Port2 are Disabled, **2F8/IRQ3** (default), 3E8/IRQ4, and 2E8/IRQ3.

Serial Port 2 Mode

Use this feature to configure Serial Port 2 mode. The options are **Normal** (default)**,** IrDA and ASK IR. IrDA (Infrared Data) is an industry standard for remote control devices. ASK IR (Amplitude Shifted Keying Infrared) is a protocol compatible with Sharp® branded PDAs and other infrared devices.

3.3.9.4 Serial Port3 Address

This option specifies the base I/O port address and the Interrupt Request address of Serial Port 3. Select Disabled to prevent the serial port from accessing any system resources. When this option is set to Disabled, the serial port physically becomes unavailable. Select 3E8/IRQ5 to allow the serial port to use 3E8 as its I/O address and IRQ 5 for the interrupt address. The options are Disabled, and **3E8/IRQ5** (default).

3.3.10 Remote Access Configuration

3.3.10.1 Remote Access

This allows the user to enable the Remote Access feature. The options are Disabled and **Enabled** (default). If Remote Access is set to Enabled, the following items will display:

Serial Port Number

This feature allows the user decide which serial port to be used for Console Redirection. The options are COM 1, COM2, and **COM3** (default)**.**

Base Address, IRQ

This item displays the base address and IRQ of the serial port used for Console Redirection.

Serial Port Mode

This feature allows the user to set the serial port mode for Console Redirection. The options are **115200 8, n 1** (default); 57600 8, n, 1; 38400 8, n, 1; 19200 8, n, 1; and 9600 8, n, 1.

Flow Control

This feature allows the user to set the flow control for Console Redirection. The options are **None** (default), Hardware, and Software.

Redirection After BIOS POST

Select Disabled to turn off Console Redirection after Power-On Self-Test (POST). Select Always to keep Console Redirection active all the time after POST. (Note: This setting may not be supported by some operating systems.) Select Boot Loader to keep Console Redirection active during POST and Boot Loader. The options are Disabled, Boot Loader, and **Always** (default).

Terminal Type

This feature allows the user to select the target terminal type for Console Redirection. The options are **ANSI** (default), VT100, and VT-UTF8.

VT-UTF8 Combo Key Support

Select Enabled to use VT-UTF8 Combo as the keyboard type to send commands from a remote console. The options are **Enabled** (default) and Disabled.

Sredir Memory Display Delay

This feature defines the length of time in seconds to display memory information. The options are **No Delay** (default)**,** Delay 1 Sec, Delay 2 Sec, and Delay 4 Sec.

3.3.11 System Health Configuration

This feature allows the user to monitor system health and review the status of each item as displayed.

3.3.11.1 CPU Overheat Alarm

This option allows the user to select the CPU Overheat Alarm setting which determines when the CPU OH alarm will be activated to provide warning of possible CPU overheat.

Caution: **1.** Any temperature that exceeds the CPU threshold temperature predefined by the CPU manufacturer may result in CPU overheat or system instability. When the CPU temperature reaches this predefined threshold, the CPU and system cooling fans will run at full speed.
2. To avoid possible system overheating, please be sure to provide adequate airflow to your system.

The options are:

- The Early Alarm: Select this setting if you want the CPU overheat alarm (including the LED and the buzzer) to be triggered as soon as the CPU temperature reaches the CPU overheat threshold as predefined by the CPU manufacturer.
- **The Default Alarm** (default): Select this setting if you want the CPU overheat alarm (including the LED and the buzzer) to be triggered when the CPU temperature reaches about 5oC above the threshold temperature as predefined by the CPU manufacturer to give the CPU and system fans additional time needed for CPU and system cooling. In both the alarms above, please take immediate action as shown below.

3.3.11.2 CPU1 Temperature/CPU2 Temperature/System Temperature

This feature displays current temperature readings for the CPU and the System. The following items will be displayed for your reference only:

CPU Temperature

The CPU thermal technology that reports absolute temperatures (Celsius/Fahrenheit) has been upgraded to a more advanced feature by Intel in its newer processors. The basic concept is each CPU is embedded by unique temperature information that the motherboard can read. This 'Temperature Threshold' or 'Temperature Tolerance' has been assigned at the factory and is the baseline on which the motherboard takes action during different CPU temperature conditions (i.e., by increasing fan speed, triggering the Overheat Alarm, etc). Since CPUs can have different 'Temperature Tolerances', the installed CPU can now send information to the motherboard what its 'Temperature Tolerance' is, and not the other way around. This results in better CPU thermal management.

Supermicro has leveraged this feature by assigning a temperature status to certain thermal conditions in the processor (Low, Medium and High). This makes it easier for the user to understand the CPU's temperature status, rather than by just simply seeing a temperature reading (i.e., 25^{o}C). The CPU Temperature feature will display the CPU temperature status as detected by the BIOS:

- **Low –** This level is considered as the 'normal' operating state. The CPU temperature is well below the CPU 'Temperature Tolerance'. The motherboard fans and CPU will run normally as configured in the BIOS (Fan Speed Control). User intervention: No action required.
- **Medium –** The processor is running warmer. This is a 'precautionary' level

and generally means that there may be factors contributing to this condition, but the CPU is still within its normal operating state and below the CPU 'Temperature Tolerance'. The motherboard fans and CPU will run normally as configured in the BIOS. The fans may adjust to a faster speed depending on the Fan Speed Control settings. User intervention: No action is required. However, consider checking the fans and the chassis ventilation for blockage.

- **High –** The processor is running hot. This is a 'caution' level since the CPU's 'Temperature Tolerance' has been reached (or has been exceeded) and may activate an overheat alarm. User intervention: If the system buzzer and Overheat LED has activated, take action immediately by checking the system fans, chassis ventilation and room temperature to correct any problems.

Note: **1**. The system may shut down if it continues for a long period to prevent damage to the CPU. **2.** The information provided above is for your reference only. For more information on thermal management, please refer to Intel's Web site atwww.Intel.com.

3.3.11.3 System Temperature

The system temperature will be displayed (in degrees in Celsius and Fahrenheit) as it is detected by the BIOS.

3.3.11.4 Voltage Monitoring

CPU1 Vcore/CPU2 Vcore, CPU1 DIMM/CPU2 DIMM, 1.5V, 3.3Vcc (V), 3.3V SB (V), 12V, 5V, and Battery Voltage.

3.3.11.5 Fan Speed Control Modes

This feature allows the user to decide how the system controls the speeds of the onboard fans. The CPU temperature and the fan speed are correlative. When the CPU on-die temperature increases, the fan speed will also increase, and vice versa. Select "Full Speed/FS" to allow the onboard fans to run at full speed for maximum cooling. The FS setting is recommended for special system configuration or debugging. Select "Performance/PF" for better system cooling. The PF setting is recommended for high-power-consuming and high-density systems. Select "Balanced/BL" for the onboard fans to run at a speed that will balance the needs between system cooling and power saving. The BL setting is recommended for regular systems with normal hardware configurations. Select "Energy Saving/ES" for best power efficiency and maximum quietness. The Options are: Full Speed/FS, Performance/PF, Balanced/BL, and **Energy Saving/ES** (default).

3.3.11.6 Fan1—Fan 8 Reading

This feature displays the fan speed readings from fan interfaces Fan1 through Fan8. (Fan7 is CPU1 Fan and Fan8 is CPU2 Fan.)

3.3.12 ACPI Configuration

Use this feature to configure Advanced Configuration and Power Interface (ACPI) power management settings for your system.

3.3.12.1 ACPI Aware O/S

Select Enabled to enable ACPI support if it is supported by the OS to control ACPI through the Operating System. Otherwise, disable this feature. The options are **YES** (default) and No.

3.3.12.2 ACPI Version Features

The options are ACPI v1.0, **ACPI v2.0** (default) and ACPI v3.0. Please refer to ACPI's website for further explanation: http://www.acpi.info/.

3.3.12.3 ACPI APIC Support

Select Enabled to include the ACPI APIC Table Pointer in the RSDT (Root System Description Table) pointer list. The options are **Enabled** (default) and Disabled.

3.3.12.4 APIC ACPI SCI IRQ

When this item is set to Enabled, APIC ACPI SCI IRQ is supported by the system. The options are Enabled and **Disabled** (default).

3.3.12.5 Headless Mode

This feature is used to enable the system to function without a keyboard, monitor or mouse attached The options are Enabled and **Disabled** (default).

3.3.12.6 NUMA Support

Select Enabled to enable Non-Uniform Memory Access support for an “NUMA-Aware” OS to improve CPU performance. Select Disabled to provide better memory access for a “non’NUMA” OS. Select NUMA for SLES 11 for better CPU performance on a SUSE Linux Enterprise Server 11. The options are **Enabled** (default), Disabled and NUMA for SLES11.

3.3.12.7 WHEA Support

Select Enabled to enable Windows Hardware Error Architecture (WHEA) support which will provide a common infrastructure for the system to handle hardware errors on Windows platforms to reduce system crashes caused by hardware errors and to improve system recovery and health monitoring. The default setting is **Enabled**.

3.3.12.8 High Performance Event Timer

Select Enabled to activate the High Performance Event Timer (HPET) that produces periodic interrupts at a much higher frequency than a Real-time Clock (RTC) does in synchronizing multimedia streams, providing smooth playback and reducing the dependency on other timestamp calculation devices, such as an x86 RDTSC Instruction embedded in the CPU. The High Performance Event Timer is used to replace the 8254 Programmable Interval Timer. The options are **Enabled** (default) and Disabled.

3.3.13 Trusted Computing

3.3.13.1 TCG/TPM (Trusted Platform Module) Support

Select Yes on this item and enable the TPM jumper on the motherboard to enable TCG (TPM 1.1/1.2)/TPM support in order to improve data integrity and network security. The options are **No** (default) and Yes.

If this feature is set to Yes, the following items will display:

TPM Enable/Disable Status

This item displays the status of TPM Enabled/Disabled state.

TPM Owner Status

This item displays the status of TPM Ownership.

3.3.14 IPMI Configuration

Intelligent Platform Management Interface (IPMI) is a set of common interfaces that IT administrators can use to monitor system health and to manage the system as a whole. For more information on the IPMI specifications, please visit Intel's website at www.intel.com.

3.3.14.1 Status of BMC

Baseboard Management Controller (BMC) manages the interface between system management software and platform hardware. This is an informational feature which returns the status code of the BMC micro controller.

3.3.14.2 IPMI Firmware Revision

This item displays the IPMI Firmware Revision Number currently used in this system.

3.3.15 View BMC System Event Log

This feature displays the BMC System Event Log (SEL). It shows the total number of entries of BMC System Events.

To view an event, select an Entry Number and pressing <Enter> to display the information as shown in the screen.

- SEL Entry Number
- SEL Record ID
- SEL Record Type
- Event Timestamp
- Generator ID
- Event Message Format Version
- Event Sensor Type
- Event Sensor Number,
- Event Dir Type
- Event Data.

3.3.15.1 Clear BMC System Event Log

Select OK and press the <Enter> key to clear the BMC system log. Select Cancel to keep the BMC System log. The options are **OK** (default) and Cancel.

Caution: Any cleared information is unrecoverable. Make absolutely sure that you no longer need any data stored in the log before clearing the BMC Event Log.

3.3.16 Set LAN Configuration

Set this feature to configure the IPMI LAN adapter with a network address as shown in the following graphics.

3.3.16.1 Channel Number

Enter the channel number for the SET LAN Config command. This is initially set to **[1]** (default). Press "+" or "-" on your keyboard to change the Channel Number.

3.3.16.2 Channel Number Status

This feature returns the channel status for the Channel Number selected above: "Channel Number is OK" or "Wrong Channel Number".

3.3.16.3 IP Address Source

This feature allows the user to select how an IP address is assigned to a client computer or network device. Select DHCP (Dynamic Host Configuration Protocol) to allow a client (computer or device) obtains an IP address from a DHCP server that manages a pool of IP addresses and network information on a "request and grant" basis. Upon time-out (or lease expiration), the IP address assigned to the client can be reassigned to a new client. Select Static (Static Allocation) to allow the host server to allocate an IP address based on a table containing MAC Address/IP Address pairs that are manually entered (probably by a network administrator). Only clients with a MAC address listed in the MAC/IP Address Table will be assigned an IP address. The IP Address allocated to the client is on a longer term basis than that assigned by the DHCP mentioned in the other option. The options are **DHCP** (default) and Static.

3.3.17 IP Address Configuration

This submenu displays the following IP Address Configuration information.

3.3.17.1 Parameter Selector

This item displays the parameter of your IP Address configuration.

3.3.17.2 IP Address

This item displays the IP address of this computer. The value of each three-digit number separated by dots should not exceed 255.

3.3.17.3 Current IP Address in BMC

This item displays the current IP address used for your IPMI connection.

3.3.18 MAC Address Configuration

This submenu displays the following MAC Address Configuration information.

3.3.18.1 Parameter Selector

Use this feature to select the parameter of your Mac Address configuration.

3.3.18.2 MAC Address

This item displays the MAC address of this computer. MAC addresses are 6 two-digit hexadecimal numbers (Base 16, 0 ~ 9, A, B, C, D, E, F) separated by dots. (i.e., 00.30.48.D0.D4.60). The value of each three-digit number separated by dots should not exceed 255.

3.3.18.3 Current MAC Address in BMC

This item displays the current MAC address used for your IPMI connection.

3.3.19 Subnet Mask Configuration

Subnet masks tell the network which subnet this machine belongs to. The value of each three-digit number separated by dots should not exceed 255.

3.3.19.1 Parameter Selector

Use this feature to select the parameter of your Subnet Masks configuration.

3.3.19.2 Subnet Mask

This item displays the current subnet mask setting for your IPMI connection. If “Static” is selected, the subnet mask setting can be entered. The value of each three-digit number separated by dots should not exceed 255.

3.3.19.3 Current Subnet Mask in the BMC

This item displays the current Subnet Mask used for your IPMI connection. The value of each three-digit number separated by dots should not exceed 255.

3.3.19.4 Gateway Address

This is the IP address of the gateway in the network that the system is connected to. It's usually a router. If "Static" is selected, the subnet mask setting can be entered. The value of each three-digit number separated by dots should not exceed 255.

3.3.19.5 Mac Address

BIOS will automatically enter your system's Mac address; however it may be over-ridden. Mac addresses are 6 two-digit hexadecimal numbers (Base 16, 0–9, A, B, C, D, E, F) separated by dots. (*i.e.,* 00.30.48.D0.D4.60)

3.3.20 Event Log Configuration

3.3.20.1 View Event Log

Use this option to view the System Event Log.

3.3.20.2 Mark all events as read

This option marks all events as read. The options are **OK** (default) and Cancel.

3.3.20.3 Clear event log

This option clears the Event Log memory of all messages. The options are **OK** (default) and Cancel.

3.3.20.4 PCIE Error Log

Select Yes to enable PCI-Express error (PERR) logging. The options are **Yes** (default) and No.

3.4 Security Settings

The AMI BIOS provides a Supervisor and a User password. If you use both passwords, the Supervisor password must be set first.

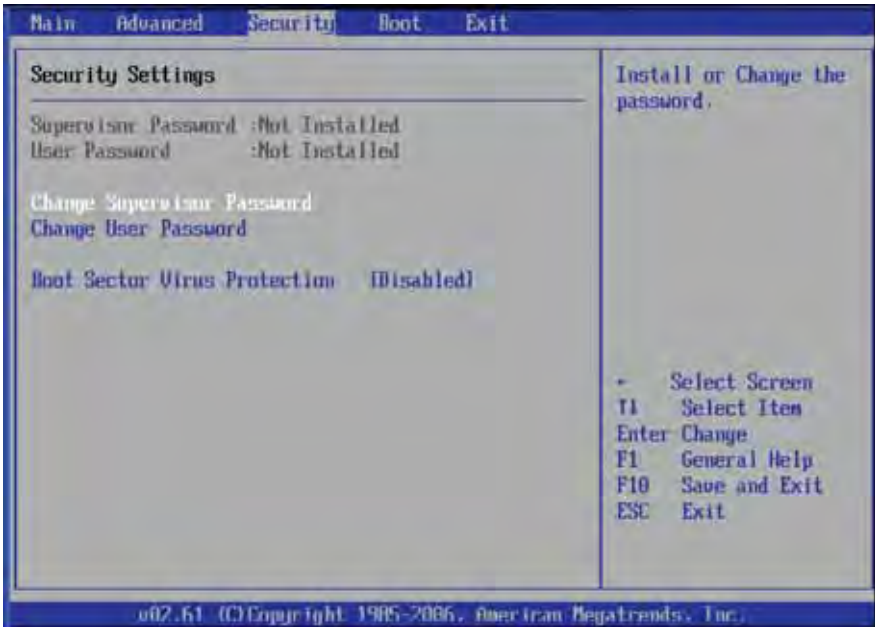


Figure 3-3. Security Settings

3.4.1 Supervisor Password

This item indicates if a Supervisor password has been entered for the system. “Not Installed” means a Supervisor password has not been used.

3.4.2 User Password

This item indicates if a user password has been entered for the system. “Not Installed” means that a user password has not been used.

3.4.3 Change Supervisor Password

Select this feature and press <Enter> to access the submenu, and then enter a new Supervisor Password.

3.4.4 User Access Level (Available when Supervisor Password is set as above)

Use this feature to set the user's access level. The options are:

- **Full Access** (default): grants full User read and write access to the Setup Utility,
- View Only: allows access to the Setup Utility, but cannot change the fields,
- Limited: allows only limited fields to be changed such as Date and Time,
- No Access: prevents User access to the Setup Utility.

3.4.5 Change User Password

Select this feature and press <Enter> to access the submenu, and then enter a new User Password.

3.4.6 Clear User Password (Available only if User Password has been set)

This item allows you to clear a user password after it has been entered.

3.4.7 Password Check

This item allows you to check a password after it has been entered. The options are **Setup** (default) and Always.

3.5 Boot Configuration

Use this feature to configure boot settings (see *Figure 3-4*).

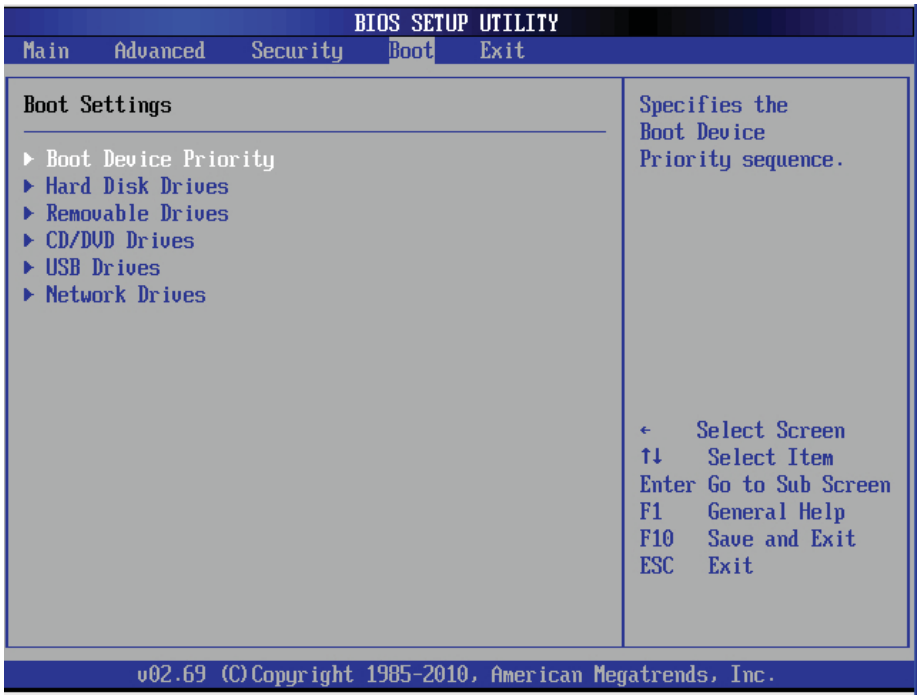


Figure 3-4. Boot Settings

3.5.1 Boot Device Priority

This feature allows the user to specify the sequence of priority for the Boot Device. The settings are 1st boot device, 2nd boot device, 3rd boot device, 4th boot device, 5th boot device, and Disabled.

- 1st Boot Device - 1st Floppy Drive
- 2nd Boot Device - [USB: XXXXXXXXX]

3.5.2 Storage Drives

This feature allows the user to specify the boot sequence from all available storage drives. The settings are Disabled and a list of all storage drives that have been detected (i.e., 1st Drive, 2nd Drive, 3rd Drive, etc).

3.5.3 Removable Drives

This feature allows the user to specify the boot sequence from available Removable Drives. The settings are 1st boot device, 2nd boot device, and Disabled.

- 1st Drive - 1st Floppy Drive
- 2nd Drive - [USB: XXXXXXXXX]

3.5.4 CD/DVD Drives

This feature allows the user to specify the boot sequence from available CD/DVD Drives (i.e., 1st Drive, 2nd Drive, etc).

3.5.5 USB Drives

Use this feature to specify the boot sequence from the available USB Drives (1st Drive, 2nd Drive).

Network Drives

Use this feature to specify the boot sequence from available Network Drives (1st Drive, 2nd Drive).

3.6 Exit Options

Select the Exit tab from the AMI BIOS Setup Utility screen to enter the Exit BIOS Setup screen.

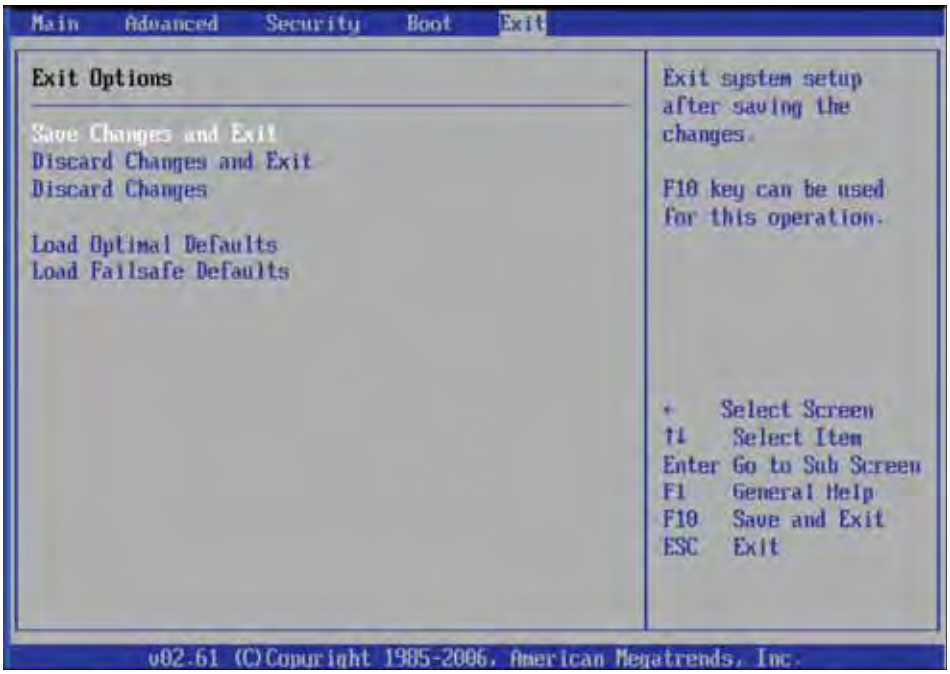


Figure 3-5. Exit Options

3.6.1 Save Changes and Exit

When you have completed the system configuration changes, select this option to leave the BIOS Setup Utility and reboot the computer, so the new system configuration parameters can take effect. Select Save Changes and Exit from the Exit menu and press <Enter>.

3.6.2 Discard Changes and Exit

Select this option to quit the BIOS Setup without making any permanent changes to the system configuration, and reboot the computer. Select Discard Changes and Exit from the Exit menu and press <Enter>.

3.6.3 Discard Changes

Select this option and press <Enter> to discard all the changes and return to the AMI BIOS Utility Program.

3.6.4 Load Optimal Defaults

To set this feature, select Load Optimal Defaults from the Exit menu and press <Enter>. Then, select OK to allow the AMI BIOS to automatically load Optimal Defaults to the BIOS Settings. The Optimal settings are designed for maximum system performance, but may not work best for all computer applications.

3.6.5 Load Fail-Safe Defaults

To set this feature, select Load Fail-Safe Defaults from the Exit menu and press <Enter>. The Fail-Safe settings are designed for maximum system stability, but not for maximum performance.

3.7 BIOS Recovery

Caution: Do not upgrade the BIOS unless your system has a BIOS-related issue. Flashing the wrong BIOS can cause irreparable damage to the system. In no event shall Supermicro be liable for direct, indirect, special, incidental, or consequential damages arising from a BIOS update. If you need to update the BIOS, do not shut down or reset the system while the BIOS is updating. This is to avoid possible boot failure.

3.7.1 How to Recover the AMIBIOS Image (the Main BIOS Block)

An AMIBIOS flash chip consists of a boot sector block, and a main BIOS code block (a main BIOS image). The boot sector block contains critical BIOS code, including memory detection and recovery code to be used to flash a new BIOS image if the original BIOS Image is corrupted. When the system is powered on, the boot sector code executes first. Once it is completed, the main BIOS code will continue with system initialization and complete the bootup process.

Note: BIOS Recovery described below is used when the main BIOS block crashes. However, when the BIOS Boot sector crashes, you will need to send the motherboard back to Supermicro for RMA repairs.

3.7.2 Boot Sector Recovery from a USB Device

This feature allows the user to recover a BIOS image using a USB device without additional utilities needed. A user can download the BIOS image into a USB flash device, and name the file “SUPER.ROM” for the recovery process to load the file. A USB flash device such as a USB Flash Drive, a USB CDROM or a USB CDRW device can be used for this purpose:

1. Insert the USB device that contains the new BIOS image (the ROM files) saved in a root directory into your USB drive.
2. While turning the power on, press and hold <Ctrl> and <Home> at the same time until the USB Access LED Indicator comes on. This might take a few seconds.

3. Once the USB drive LED is on, release the <Ctrl> and <Home> keys. AMI-BIOS will issue beep codes to indicate that the BIOS ROM file is being updated.

4. When BIOS flashing is completed, the computer will reboot. Do not interrupt the flashing process until it is completed.

3.7.3 Boot Sector Recovery from an IDE CD-ROM

This process is almost identical to the process of Boot Sector Recovery from a USB device, except that the BIOS image file is loaded from a CD-ROM. Use a CD-R or CD-RW drive to burn a CD with the BIOS image file in it, and name the file "SUPER.ROM" for the recovery process to load the file.

3.7.4 Boot Sector Recovery from a Serial Port ("Serial Flash")

This process, also known as "Serial Flash," allows the user to use a serial port to load a BIOS image for Boot Sector recovery. This feature is usually used for embedded systems that rely on a serial port for remote access and debugging.

Requirements

In order to use Serial Flash for Boot Sector Recovery, you will need to meet the following requirements.

- The "Target system," the system that needs BIOS updates, must have a serial port and "Serial Flash" support embedded in the BIOS image file.
- The "Host system" should also have a serial port and a terminal program that supports XModem Transfer protocol (Hyper Terminal for the Windows operating systems, and minicom for Linux/FreeSBD, etc.).
- A Null_modem serial cable

How to use Serial Flash for Boot Sector Recovery:

1. Connect a Null_modem serial cable between the target system and the host system that runs the terminal program.

2. Make sure that the new BIOS Image file is accessible for the host system.

3. Start the terminal program on the host system and create a new connection.

Use the following communication parameters for the new connection.

- Bits per second: 115200 bits/sec.
- Data Bits: 8
- Parity: None
- Stop Bit: 1
- Flow Control: None

4. When BIOS flashing is completed, the computer will reboot. Do not interrupt the flashing process until it is completed.

```
..................... Press <SpaceBar> to update BIOS.
........................ Confirm update BIOS? (y/n) y
..................... Begin remote BIOS flash? (y/n) y
............................... Starting remote flash.
......... Upload new BIOS file using Xmodem protocol.
```

5. Following the instructions given on the screen to update the BIOS. These instructions are also shown below.

a. At the prompt, press the <SpaceBar> to update the BIOS.

b. When asked to confirm BIOS updating, press <y> to confirm BIOS updates.

c. Press <y> again to begin flashing BIOS remotely.

Note: Be sure to complete Steps a to c above quickly because you have a second or less to do so.

6. Once you've completed the instructions given, a screen will display to indicate that remote flashing is starting and the new BIOS file is being uploaded.

7. To use Hyper Terminal to transfer the XModem protocol by using the “Send File” dialog under the “Transfer” menu, follow the instructions below to complete XModem transfers.

a. Select the “Transfer” menu and enter <Send> (see *Figure 3-6*).

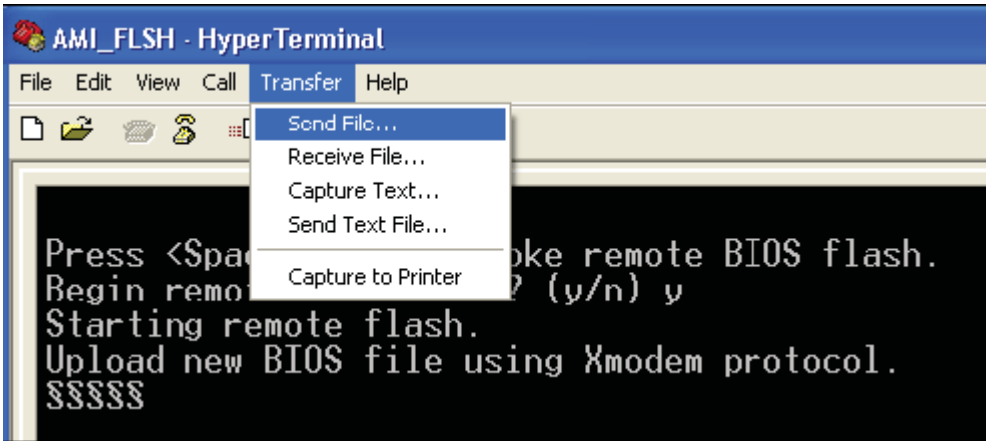


Figure 3-6. AMI_FLSH Hyperterminal

b. Specify the location of the ROM file and select the proper protocol (XModem).

c. Press <Send> to start ROM File extraction. (see *Figure 3-7*)

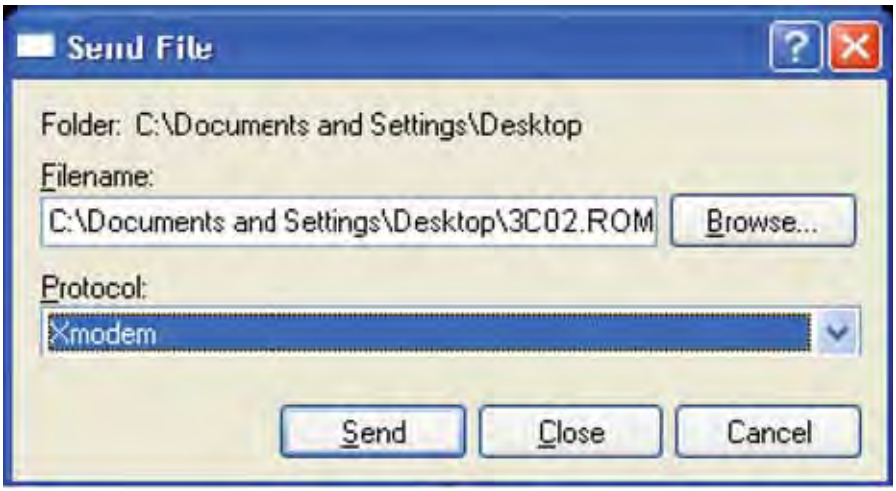


Figure 3-7. ROM File Extraction

d. Once the ROM file extraction is completed, the message: “New BIOS received OK” will display.

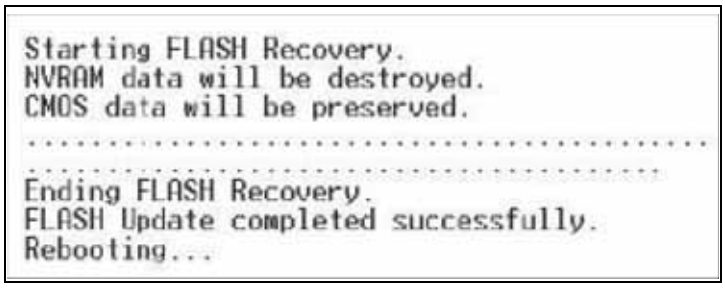


Figure 3-8. FLASH Recovery

8. After the remote BIOS flash is completed, the system will reboot.

Note: AMBIOS Serial Flash will work with any terminal communications program that supports VT-100 and XModem protocols, including protocols designed for GNU/LINUX & BSD operating systems such as minicom. It is recommended that the terminal program be configured to use the “CR/LF” style of line termination.

Appendix A

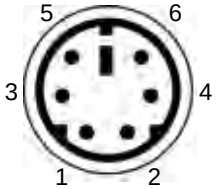
Connector Pinouts

This appendix provides connector pinouts for all standard user I/O interfaces on the RES-32XR3 Configuration 3.

A.1 PS/2 Keyboard and Mouse

The RES-32XR3 Configuration 3 provides a 6-pin **female** mini-DIN connector for the PS/2 keyboard, and another for the PS/2 mouse. Signals for both connectors are defined in *Table A-1*.

Table A-1. PS/2 Keyboard/Mouse Pinout and Signal Descriptions



Pin	Signal Name
1	Keyboard/mouse data
2	*N/C*
3	Ground
4	Vcc
5	Keyboard/mouse clock
6	*N/C*

A.2 USB Ports

The RES-32XR3 supports two USB (Universal Serial Bus) port connectors (see *Figure A-1* for a connector pinout), USB 0 and USB 1, on the rear I/O panel.

Pinout descriptions are listed in *Table A-2*.

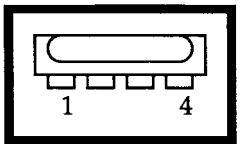


Figure A-1. USB Connector Pinout

Table A-2. USB Connector Pinout Signal Descriptions

Pin	Signal Name
1	+5V
2	PO–

Pin	Signal Name
3	PO+
4	GND

A.3 Serial Port

The RES-32XR3 supports one **male** DB9 serial port connector on the rear I/O panel (see *Figure A-2*)—TTYA (COM1).

COM1 pinout signal descriptions are listed in *Table A-3*.

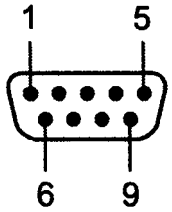


Figure A-2. COM1 Serial Connector Pinout

Table A-3. COM1 Serial Connector Pinout Signal Descriptions

Pin	Signal Name
1	DCD
2	RXD
3	TXD

Pin	Signal Name
4	DTR
5	GND
6	DSR

Pin	Signal Name
7	RTS
8	CTS
9	RI

A.4 SVGA Monitor Port

A Super-VGA connector is installed on the RES-32XR3 Configuration 3 on the rear I/O panel. A pinout for this connector is given in *Figure A-3*, and connector-pin signals are described in *Table A-4*.

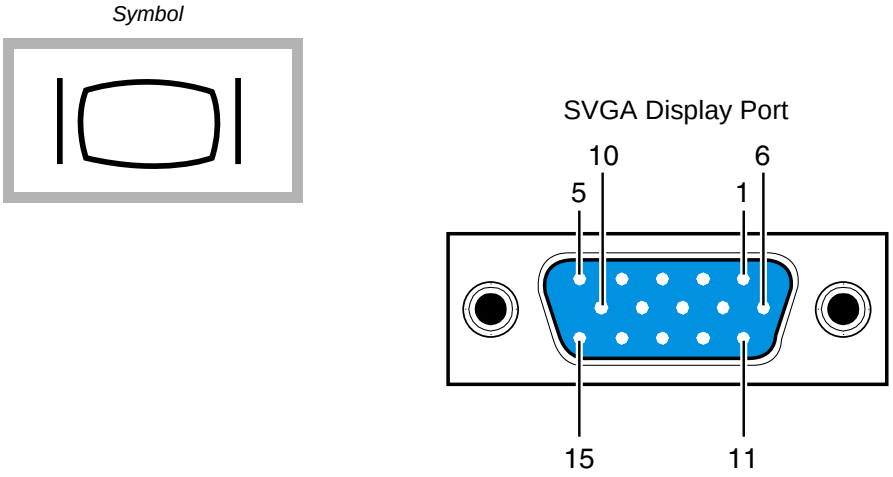


Figure A-3. RES-32XR3 SVGA Connector Pinout

Table A-4. RES-32XR3 SVGA Connector-Pin Signals

Pin	VGA Signal	Description
1	RED OUT	Red signal output
2	GREEN OUT	Green signal output
3	BLUE OUT	Blue signal output
4	*NC*	No connection
5	GND	Ground
6	GND	Ground
7	GND	Ground
8	GND	Ground

Pin	VGA Signal	Description
9	VCC	Filtered Vcc voltage source
10	GND	Ground
11	*NC*	No connection
12	SDA	Display Data Channel—Data
13	HSYNC	Horizontal synchronization
14	VSYNC	Vertical synchronization
15	SCL	Display Data Channel—Clock

A.5 Gigabit Ethernet LAN Ports

The RES-32XR3 supports four RJ45 Gigabit Ethernet LAN port connectors (LAN 1, LAN 2, LAN 3, and LAN 4), each with two embedded LEDs (see *Figure A-4*).

Note: LAN 3 and LAN 4 are installed on X8DT3-LN4F and X8DTi-LN4F motherboards only.

Pinout signal descriptions are listed in *Table A-5*.

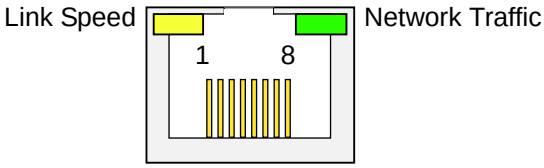


Figure A-4. Ethernet Connector, Type RJ45

Table A-5. RJ45 Ethernet Pinout Signals

Pin	Signal Name		Pin	Signal Name
1	TRD0+		5	TRD2-
2	TRD0-		6	TRD1-
3	TRD1+		7	TRD3+
4	TRD2+		8	TRD3-

- The color of the left LED indicates the LAN connection speed:
  - — Off = 10 MHz
  - — Green = 100 MHz
  - — Amber = 1 GHz
- The right LED, when lit, indicates LAN activity (network traffic).

A.6 IPMI Dedicated LAN Port

The single IPMI dedicated Ethernet LAN port on the RES-32XR3 rear I/O panel has identical pinout and signal descriptions as the LAN Ethernet ports described in Section A.5, “Gigabit Ethernet LAN Ports”. Note that the X8DT3 motherboard does not support IPMI, hence does not have the IPMI dedicated LAN port installed.

Appendix B

Rack-Mount Slide Installation

An *optional* set of two rack-mount slides (left side and right side) is available for all RES-32 systems, and should be ordered at the time of purchase. The RES-32XR3 chassis contains six threaded screw holes on each side to accommodate #8-32 size screws (included with the rack-mount slide kit); steel slides require four mounting holes, and aluminum slides require three mounting holes (see *Figure B-1*).

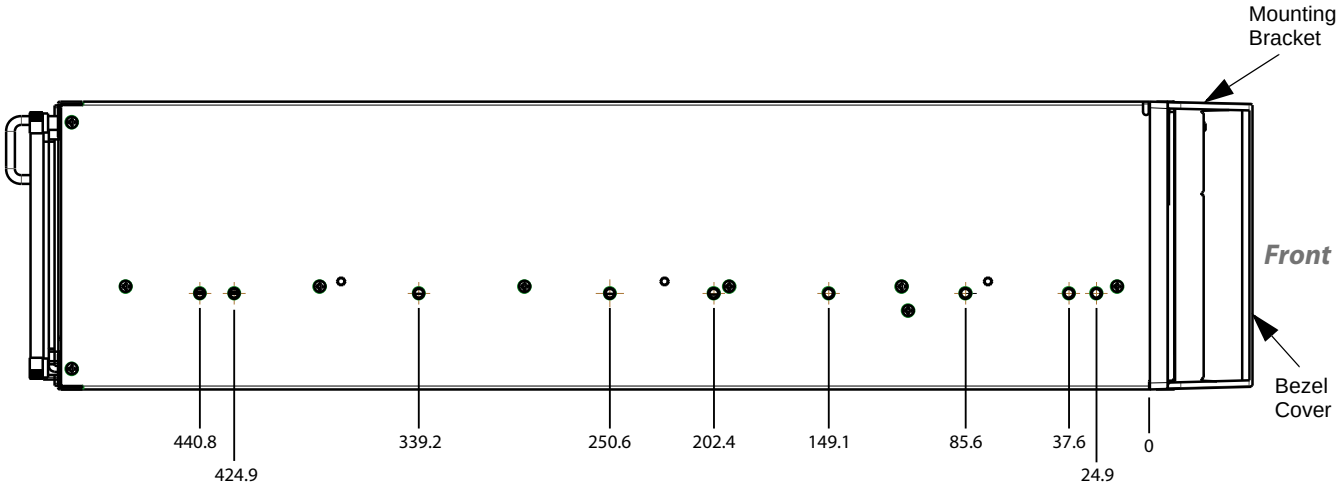


Figure B-1. Screw Locations for Rack-Mount Slides

Dimensions of the screw-hole patterns on the sides of the RES-32XR3 chassis for installing rack-mount slides are shown in *Figure B-1*.

Caution: Any screws used to mount a slide to a RES-32 chassis must not exceed a length of 3/8” to prevent excessive penetration of the chassis.

The rack-mount slide installation kit includes the following items:

a. Two inside slide sections

b. Two outside slide sections

c. Two front (short) slide brackets

d. Two rear (long) slide brackets

e. Assorted screws, washers, and nuts

Follow these steps to install a steel rack-mount slide to the RES-32XR3 chassis:

1. Attach the inside slide section (see *Figure B-2* on page B-3) to both sides of the RES-32XR3 chassis using four #8-32 screws per side.
2. Measure the depth of the 19” equipment rack into which the RES-32XR3 system will be installed (this can vary from 24” to 30”).
3. Using the depth of the equipment rack, adjust and attach the front and rear slide brackets to the outside slide section using the screws, washers, and nuts provided with the slide kit.
4. With all slide brackets securely attached to both the right and left outside slide sections, install both sections to the inside right and inside left of a 19” rack with two bolts per bracket, making sure there is adequate room for the 3-RU height (5.25”) of a RES-32XR3 system.
5. Carefully insert the RES-32XR3 system into the 19” rack so that the inside slides on both sides of the chassis travel smoothly into the channels of the outside slide sections. Push the system into the rack until the mounting brackets on the front of the chassis are flush with the front of the rack.
6. Secure the RES-32XR3 system to the 19” rack with two bolts on each side.

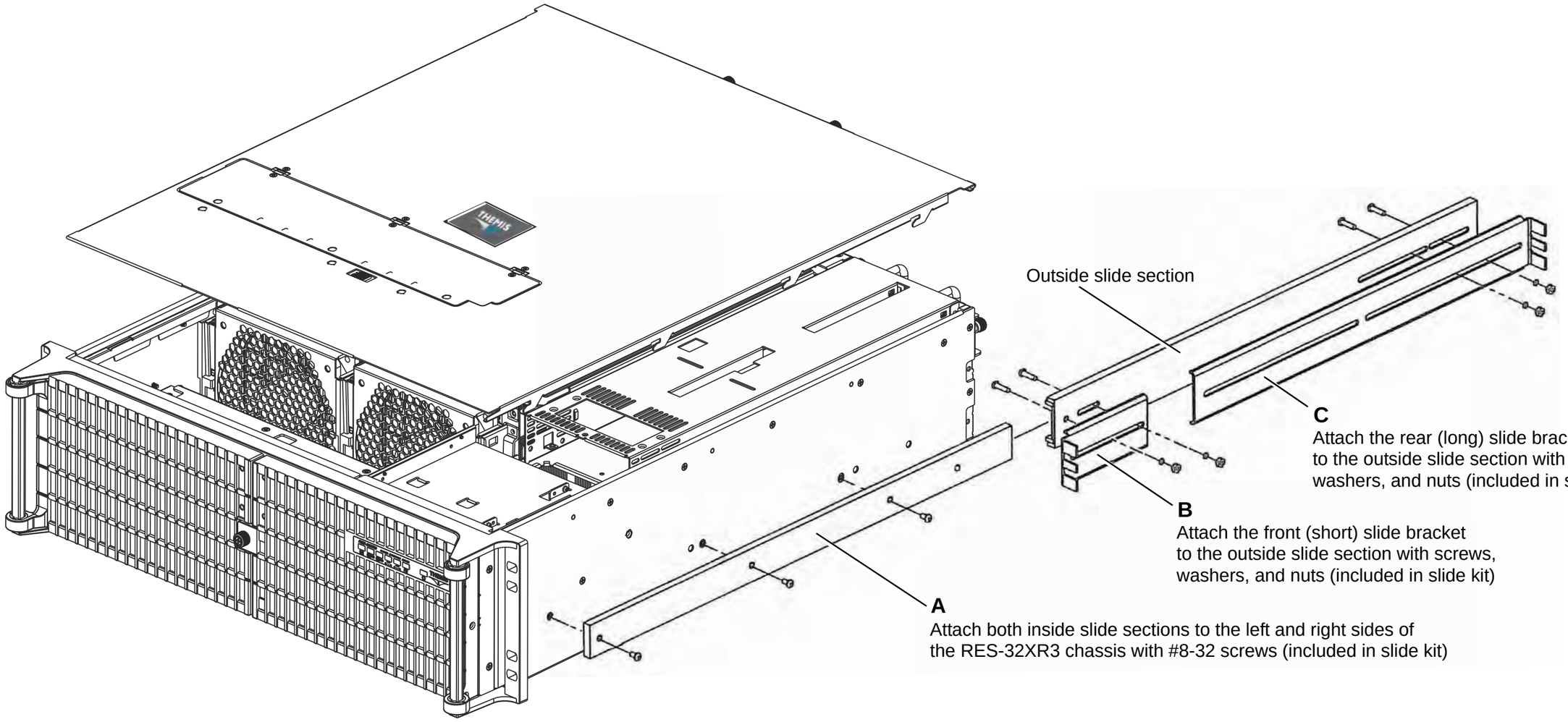

Outside slide section
C
Attach the rear (long) slide bracket to the outside slide section with screws, washers, and nuts (included in slide kit)
B
Attach the front (short) slide bracket to the outside slide section with screws, washers, and nuts (included in slide kit)
A
Attach both inside slide sections to the left and right sides of the RES-32XR3 chassis with #8-32 screws (included in slide kit)

Figure B-2. RES-32XR3 Rack-Mount Slide Installation

Appendix C

Red Hat Enterprise Linux 5 Installation

C.1 Introduction

Welcome to the Red Hat® Enterprise Linux® Installation Guide. This guide contains useful information to assist you during the installation of Red Hat Enterprise Linux via DVD device. From fundamental concepts such as installation preparation to the step-by-step installation procedure.

C.2 Installation

Step 1: Insert the Redhat Enterprise Linux 5 DVD and Power on the system; you will see the first installation screen with a boot prompt, press “ENTER” to begin installation (see *Figure C-1* on page C-2).

RED HAT
ENTERPRISE LINUX 5
- To install or upgrade in graphical mode, press the key.
- To install or upgrade in text mode, type: .
- Use the function keys listed below for more information.
[F1-Main] [F2-Options] [F3-General] [F4-Kernel] [F5-Rescue]
boot: _

Figure C-1. Power On after Linux DVD is Inserted into Drive

Step 2: Press the “tab” key to move focus to the “Skip” key, then press “Enter” key to Continue (see *Figure C-2* on page C-2).

Welcome to Red Hat Enterprise Linux Server
CD Found
To begin testing the CD media before installation press OK.
Choose Skip to skip the media test and start the installation.
OK
Skip
<Tab>/<Alt-Tab> between elements | <Space> selects | <F12> next screen

Figure C-2. Skip Key

Step 3: Press Enter and you will see the **Welcome** screen. Welcome screen does not prompt you for any input. From this screen you can access the Release Notes for Red Hat Enterprise Linux 5.0.0 by clicking on the Release Notes button (see *Figure C-3* on page C-3.)

Figure C-3. Welcome Screen

Click on the **Next** button to continue.

Step 4: Using your mouse, select a language to use for the installation. The language you select here will become the default language for the operating system once it is installed. Selecting the appropriate language also helps target your time zone configuration later in the installation. The installation program tries to define the appropriate time zone based on what you specify on this screen (see *Figure C-4* on page C-4).

redhat
Additional Language Support
Select a language to use as the default language. The default language will be the language used on the system once installation is complete. If you choose to install other languages, it is possible to change the default language after the installation.
Red Hat Linux can install and support several languages. To use more than one language on your system, choose specific languages to be installed, or select all languages to have all available languages installed on the system.
Use the Reset button to cancel
Select the default language for the system:
English (USA)
Select additional languages to install on the system:
English (Great Britain)
English (Hong Kong)
English (India)
English (Ireland)
English (New Zealand)
English (Philippines)
English (Singapore)
English (South Africa)
English (Zimbabwe)
Faroese (Faroe Islands)
French (Belgium)
French (Canada)
French (France)
French (Luxembourg)
Select All
Select Default Only
Reset
Hide Help
Release Notes
Back
Next

Figure C-4. Language Selection

Once you select the appropriate language, click **Next** to continue.

Step 5: Using your mouse, select the correct layout type (for example, U.S. English) for the keyboard you would prefer to use for the installation and as the system default (see *Figure C-5* on page C-5).

Figure C-5. Selecting Layout Type

Once you have made your selection, click **Next** to continue.

Step 6: Enter the installation number, if you don't have an installation number; select the Skip Entering Installation Number Radio Button. Click **OK**, and if you did not enter an installation number, you'll be given a warning. Click **Skip** to continue (see *Figure C-6* on page C-6).

Figure C-6. Enter Installation Number

Click **Next** to continue.

Step 7: Partitioning allows you to divide your hard drive into isolated sections, where each section behaves as its own hard drive. Partitioning is particularly useful if you run multiple operating systems.

On this screen you can choose to create the default layout or choose to manual partition using the 'Create custom layout' option of **Disk Druid**.

The first three options allow you to perform an automated installation without having to partition your drive(s) yourself. If you do not feel comfortable with partitioning your system, it is recommended that you *do not* choose to create a custom layout and instead let the installation program partition for you.

You can configure an iSCSI target for installation, or disable a dmraid device from this screen by clicking on the 'Advanced storage configuration' button (see *Figure C-7* on page C-7).

RED HAT
ENTERPRISE LINUX 5
Installation requires partitioning of your hard drive.
By default, a partitioning layout is chosen which is
reasonable for most users. You can either choose
to use this or create your own.
Remove linux partitions on selected drives and create default layout.
Select the drive(s) to use for this installation.
Advanced storage configuration
Review and modify partitioning layout
Release Notes
Back
Next

Figure C-7. Partitioning

Click **Next** to continue.

Step 8: Create default layout allows you to have some control concerning what data is removed (if any) from your system. Your options are:

- Remove all partitions on selected drives and create default layout — select this option to remove all partitions on your hard drive(s) (this includes partitions created by other operating systems such as Windows VFAT or NTFS partitions).
- Remove Linux partitions on selected drives and create default layout — select this option to remove only Linux partitions (partitions created from a previous Linux installation).
- This does not remove other partitions you may have on your hard drive(s) (such as VFAT or FAT32 partitions).
- Use free space on selected drives and create default layout — select this option to retain your current data and partitions, assuming you have enough free space available on your hard drive(s).

Using your mouse, choose the storage drive(s) on which you want Red Hat Enterprise Linux to be installed. If you have two or more drives, you can choose which drive(s) should contain this installation. Unselected drives, and any data on them, are not touched.

To review and make any necessary changes to the partitions created by automatic partitioning, select the Review option. After selecting Review and clicking Next to move forward, the partitions created for you in Disk Druid appear. You can make modifications to these partitions if they do not meet your needs (see *Figure C-8*).

redhat.
Installation requires partitioning of your hard drive.
By default, a partitioning layout is chosen which is
reasonable for most users. You can either choose
Remove all partitions on selected drives and create default layout.
Remove linux partitions on selected drives and create default layout.
Use free space on selected drives and create default layout.
Create custom layout.
Advanced storage configuration
Review and modify partitioning layout
Release Notes
Back
Next

Figure C-8. Reviewing Option

Click **Next** once you have made your selections to proceed.

Step 9: If you chose one of the automatic partitioning options and selected Review, you can either accept the current partition settings (click **Next**), or modify the setup using Disk Druid, the manual partitioning tool.

If you chose to create a custom layout, you must tell the installation program where to install Red Hat Enterprise Linux. This is done by defining mount points for one or more disk partitions in which Red Hat Enterprise Linux is installed. You may also need to create and/or delete partitions at this time (see *Figure C-9* on page C-9).

Figure C-9. Creating a Custom Layout

Click **Next**.

Step 10: Once you have configured your partitions, set up a boot loader. If you select “No”, Boot Loader will be Installed, you’ll need to use a third-party boot loader such as Partition Magic or Microsoft’s TLDR. Unless you want to set up a Boot Loader Password or Configure Advanced Boot Loader Options (see *Figure C-10* on page C-10).

RED HAT
ENTERPRISE LINUX 5
The GRUB boot loader will be installed on /dev/sda.
No boot loader will be installed.
You can configure the boot loader to boot other operating systems. It will allow you to select an operating system to boot from the list. To add additional operating systems, which are not automatically detected, click 'Add.' To change the operating system booted by default, select 'Default' by the desired operating system.
Default
Label
Device
Red Hat Enterprise Linux Server
/dev/VolGroup00/LogVol00
Add
Edit
Delete
A boot loader password prevents users from changing options passed to the kernel. For greater system security, it is recommended that you set a password.
Use a boot loader password
Configure advanced boot loader options
Release Notes
Back
Next

Figure C-10. Setting Up Boot Loader

To configure more advanced boot loader options, such as changing the drive order or passing options to the kernel, be sure **Configure advanced boot loader options** is selected before clicking **Next**.

Step 11: Now that you have chosen which boot loader to install, you can also determine where you want the boot loader to be installed. You may install the boot loader in one of two places:

- **The master boot record (MBR)** — This is the recommended place to install a boot loader, unless the MBR already starts another operating system loader, such as System Commander.

  The MBR is a special area on your hard drive that is automatically loaded by your computer's BIOS, and is the earliest point at which the boot loader can take control of the boot process. If you install it in the MBR, when your machine boots, GRUB presents a boot prompt. You can then boot Red Hat Enterprise Linux or any other operating system that you have configured the boot loader to boot (see *Figure C-11* on page C-11).

- **The first sector of your boot partition** — This is recommended if you are already using another boot loader on your system. In this case, your other boot loader takes control first. You can then configure that boot loader to start GRUB, which then boots Red Hat Enterprise Linux.

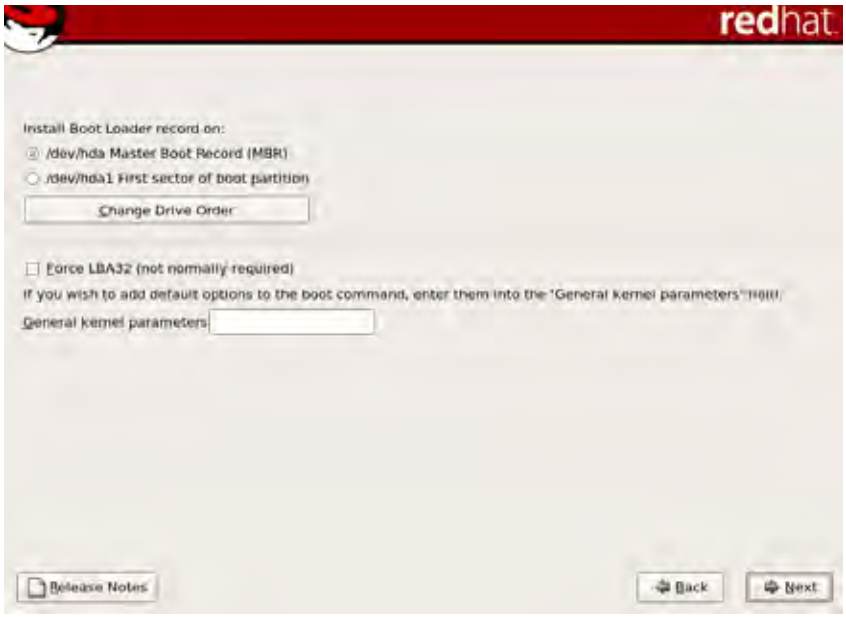

redhat
Install Boot Loader record on:
/dev/hda Master Boot Record (MBR)
/dev/hda1 First sector of boot partition
Change Drive Order
Force LBA32 (not normally required)
If you wish to add default options to the boot command, enter them into the "General kernel parameters" field.
General kernel parameters
Release Notes
Back
Next

Figure C-11. Master Boot Record (MBR)

If your system only uses Red Hat Enterprise Linux, you should choose the MBR.

Click the **Change Drive Order** button if you would like to rearrange the drive order or if your BIOS does not return the correct drive order. Changing the drive order may be useful if you have multiple SCSI adapters, or both SCSI and IDE adapters, and you want to boot from the SCSI device.

Click **Next**.

Step 12: The installation program automatically detects any network devices you have and displays them in the **Network Devices** list (see *Figure C-12* on page C-12).

Figure C-12. Network Devices List

Step 13: Once you have selected a network device, click Edit. From the Edit Interface pop-up screen, you can choose to configure the IP address and Netmask (for IPv4 - Prefix for IPv6) of the device via DHCP (or manually if DHCP is not selected) and you can choose to activate the device at boot time. If you select Activate on boot, your network interface is started when you boot (see *Figure C-13* on page C-13). If you do not have DHCP client access or you are unsure what to provide here, please contact your network administrator.

Figure C-13. Edit Interface Pop-Up Screen

Click **OK**.

Step 14: Set your time zone by selecting the city closest to your computer's physical location. Click on the map to zoom in to a particular geographical region of the world (see *Figure C-14* on page C-14).

From here there are two ways for you to select your time zone:

1. Using your mouse, click on the interactive map to select a specific city (represented by a yellow dot). A red **X** appears indicating your selection.
2. You can also scroll through the list at the bottom of the screen to select your time zone. Using your mouse, click on a location to highlight your selection.

Figure C-14. Selecting Time Zone

Click **Next**.

Step 15: Setting up a root account and password is one of the most important steps during your installation.

Your root account is similar to the administrator account used on Windows NT machines.

The root account is used to install packages, upgrade RPMs, and perform most system maintenance.

Logging in as root gives you complete control over your system (see *Figure C-15* on page C-15).

Figure C-15. Setting Up Root Account and Password

Click **Next**.

Step 16: Now that you have made most of the choices for your installation, you are ready to confirm the default package selection or customize packages for your system.

The Package Installation Defaults screen appears and details the default package set for your Red Hat Enterprise Linux installation. This screen varies depending on the version of Red Hat Enterprise Linux you are installing (see *Figure C-16* on page C-16).

To customize your package set further, select the **Customize now** option on the screen. Clicking **Next** takes you to the **Package Group Selection** screen.

You can select package groups, which group components together according to function (for example, **X Window System** and **Editors**), individual packages, or a combination of the two.

To select a component, click on the checkbox beside it.

RED HAT
ENTERPRISE LINUX 5
The default installation of Red Hat Enterprise Linux Server includes a set of software applicable for general internet usage. What additional tasks would you like your system to include support for?
Software Development
Web server
You can further customize the software selection now, or after install via the software management application.
Customize later
Customize now
Release Notes
Back
Next

Figure C-16. Package Installation Default Screen

Step 17: Select each component you wish to install.

Once a package group has been selected, if optional components are available you can click on Optional packages to view which packages are installed by default, and to add or remove optional packages from that group (see *Figure C-17* on page C-17). If there are no optional components this button will be disabled

Figure C-17. Optional Packages

Click **Next**.

Step 18: Once you have selected the package groups of your choice, you get one last chance to go back before starting the installation process. Click **Next** if you're happy with your choices, or click **Back** to make changes (see *Figure C-18* on page C-18).

RED HAT
ENTERPRISE LINUX 5
Click next to begin installation of Red Hat Enterprise Linux Server.
A complete log of the installation can be found in the file '/root/install.log' after rebooting your system.
A kickstart file containing the installation options selected can be found in the file '/root/anaconda-ks.cfg' after rebooting the system.
Release Notes
Back
Next

Figure C-18. Option to Review or Continue

Click **Next**.

Step 19: Installation Starts (see *Figure C-19*).

Figure C-19. Installation Begins

Step 20: Congratulations! Your Red Hat Enterprise Linux installation is now complete!

The installation program prompts you to prepare your system for reboot. Remember to remove any installation media if it is not ejected automatically upon reboot (see *Figure C-20*).

RED HAT
ENTERPRISE LINUX 5
Congratulations, the installation is complete.
Remove any media used during the installation process and press the "Reboot" button to reboot your system.
Release Notes
Reboot

Figure C-20. Installation is Complete

After your computer's normal power-up sequence has completed, the graphical boot loader prompt appears at which you can do any of the following things:

- Press Enter — causes the default boot entry to be booted.
- Select a boot label, followed by Enter — causes the boot loader to boot the operating system corresponding to the boot label.
- Do nothing — after the boot loader's timeout period, (by default, five seconds) the boot loader automatically boots the default boot entry.

Do whatever is appropriate to boot Red Hat Enterprise Linux. One or more screens of messages should scroll by.

Step 21: Eventually, a login: prompt or a GUI login screen (if you installed the X Window System and chose to start X automatically) appears (see *Figure C-21*.

Figure C-21. Login Screen

Step 22: Once logged in, you are ready to use the desktop (see *Figure C-22*).

Figure C-22. Ready to use the Desktop

Appendix D

Optional Remote On/Off Switch

D.1 Remote On/Off Configuration

Customers interested in installing an *optional* switch from which to remotely turn the RES-32XR3 Configuration 3 **on** or **off** are able to order a Remote On/Off Switch module that is easily installed in an available storage-drive bay (see *Figure D-1*, which shows the Remote On/Off Switch installed in an RES-32XR3/FIO system).

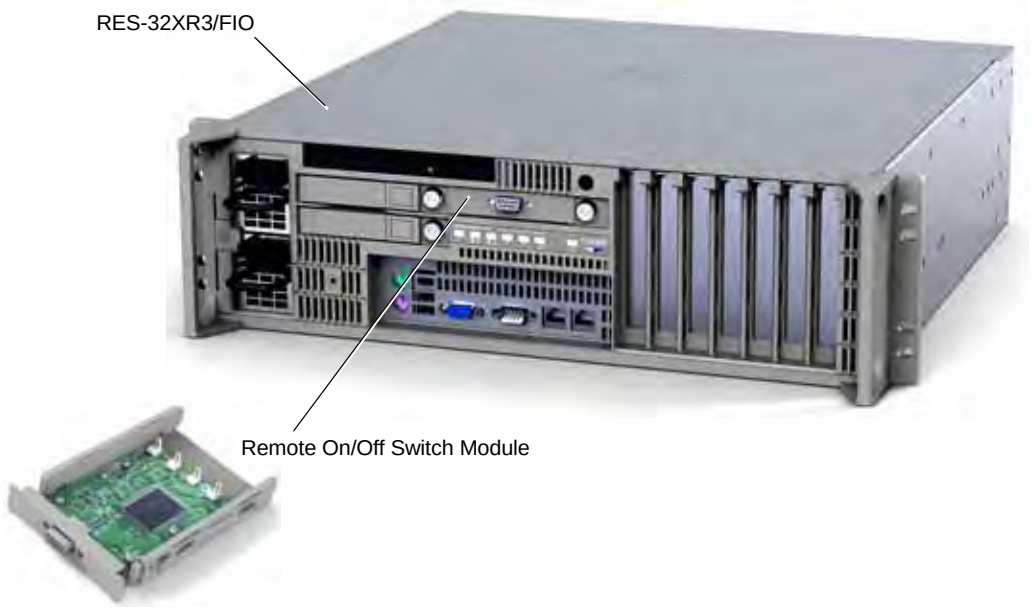


Figure D-1. Remote On/Off Switch Module

The Remote On/Off Switch module is installed after first removing one of the existing RES-32XR3 storage drives (any except the boot drive), then installing a cable with a standard male DB9 connector at one end and an On/Off switch (an LED is *optional*) at the other end.

When operational, if the RES-32XR3 Configuration 3 is turned **OFF**, pressing the remote switch ON will turn the system on.

D.2 Remote On-Only Configuration

When the Remote On/Off Switch module is configured as an ON-only device, pressing the remote switch ON will turn the system on. Turning the RES system off, however, requires pressing the ON/OFF button that is located directly on the front of the RES-32XR3 chassis.

D.3 Ordering the Remote On/Off Switch

Because internal modifications must be made to the RES-32XR3 Configuration 3 in order to support the Remote On/Off Switch module, the module must be ordered and installed at the time your system is ordered.

Appendix E

Optional RES Audio/USB/Serial Port Module

E.1 RES Audio/USB/Serial Port Custom Module

Customers interested in adding audio, USB, and serial port capabilities to the front of any RES system can easily order an *optional* RES Audio/USB/Serial Port Custom Module (see *Figure E-1*) that is installed at the Themis factory into an available storage-drive bay (see following *Caution*).

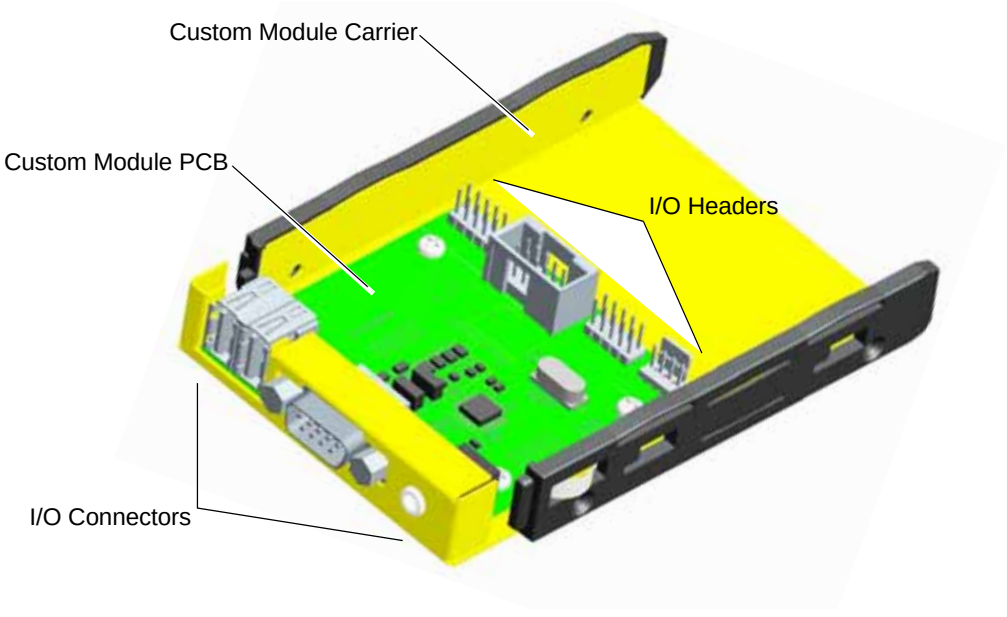


Figure E-1. RES Audio/USB/Serial Port Custom Module

Caution: Because connections must be made internally from the RES Custom Module to the RES motherboard, the RES Custom Module must be installed at the Themis factory before being shipped to the customer. Do not attempt to remove the RES Custom Module from its drive slot unless you have some hardware experience (see the following paragraph, *Figure E-2*, and *Figure E-3* on page E-3.

The RES Audio/USB/Serial Port Custom Module is installed after first removing one of the existing RES storage drives (any one except the boot drive) then connecting the appropriate I/O cables from the RES Audio/USB/Serial Port Custom Module to the external devices. After the storage drive has been removed from the system, cables from the internal RES motherboard are fed through the open drive slot and attached to the I/O headers on the top surface of the Custom Module PCB, and the Module is inserted into the vacant drive slot (see *Figure E-2*). [Note that a RES-32XR3/FIO is shown in this Appendix, although the Module may be installed into any RES system.] *Figure E-3* on page E-3 shows the internal connections that are made between the RES Custom Module and the RES motherboard.

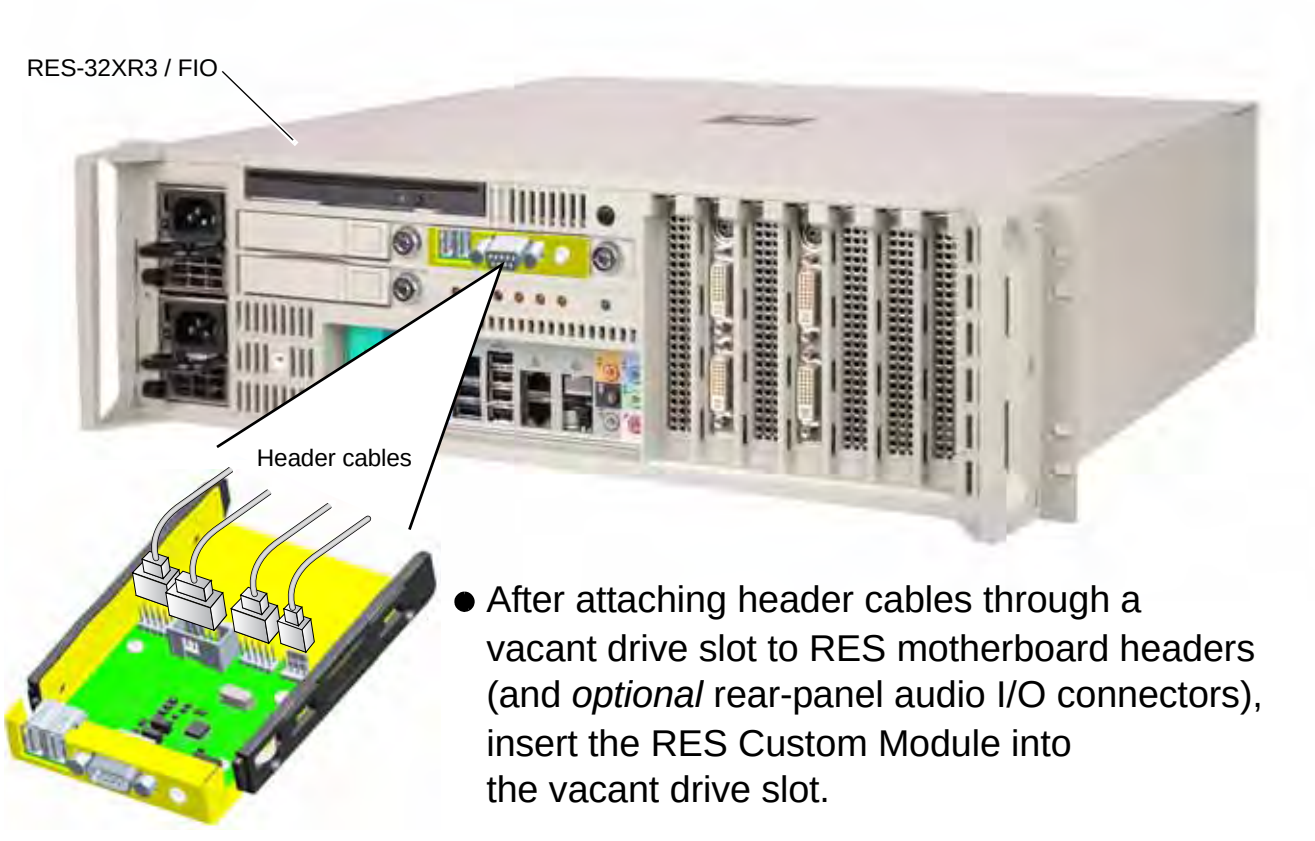

RES-32XR3 / FIO
Header cables
RES Audio/USB/Serial Port Custom Module
● After attaching header cables through a vacant drive slot to RES motherboard headers (and *optional* rear-panel audio I/O connectors), insert the RES Custom Module into the vacant drive slot.

Figure E-2. Install the RES Audio/USB/Serial Port Custom Module

E.1.1 Attach I/O Cables

Figure E-3 shows the three types of I/O supported by the RES Audio/USB/Serial Port Custom Module:

- USB Port A and Port B
- One Serial Port
- One *optional* Stereo Audio Jack (installed only by customer request)

Figure E-3 also shows the header connectors that are routed by cable through the empty drive slot into the RES system for connection to the proper RES motherboard surface headers or *optional* rear audio connectors.

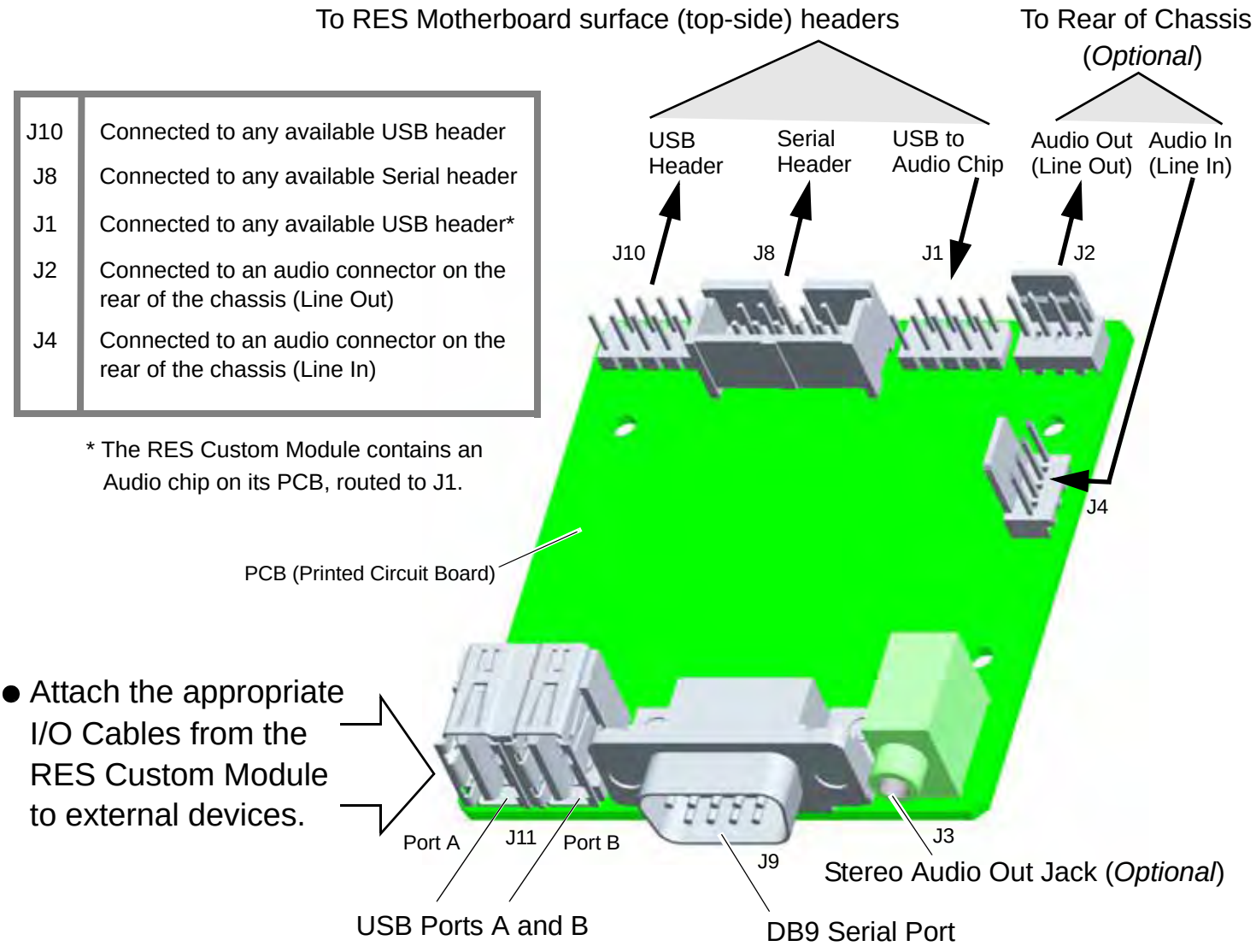

To RES Motherboard surface (top-side) headers
To Rear of Chassis (*Optional*)
J10 Connected to any available USB header
J8 Connected to any available Serial header
J1 Connected to any available USB header*
J2 Connected to an audio connector on the rear of the chassis (Line Out)
J4 Connected to an audio connector on the rear of the chassis (Line In)
* The RES Custom Module contains an Audio chip on its PCB, routed to J1.
USB Header
Serial Header
USB to Audio Chip
Audio Out (Line Out)
Audio In (Line In)
J10
J8
J1
J2
J4
PCB (Printed Circuit Board)
● Attach the appropriate I/O Cables from the RES Custom Module to external devices.
Port A
J11
Port B
J9
J3
Stereo Audio Out Jack (*Optional*)
USB Ports A and B
DB9 Serial Port

Figure E-3. Attach the Appropriate I/O Cables

If the RES Audio/USB/Serial Port Custom Module is removed from its drive slot, it is recommended that the end of the motherboard I/O cable attached to the Module header be appropriately tagged so that it can be correctly reconnected when the Module is reinstalled. If the I/O cable is removed from its motherboard header, it should also be appropriately tagged for proper reconnection at a later time.

E.1.2 Connector Pinouts

E.1.2.1 USB Ports A and B

The RES Audio/USB/Serial Port Custom Module supports two USB (Universal Serial Bus) port connectors (see *Figure E-4* for pinouts), USB A and USB B, on the front I/O panel.

USB pinout descriptions are listed in *Figure E-4*; pinout signal descriptions are described in *Table E-1*.

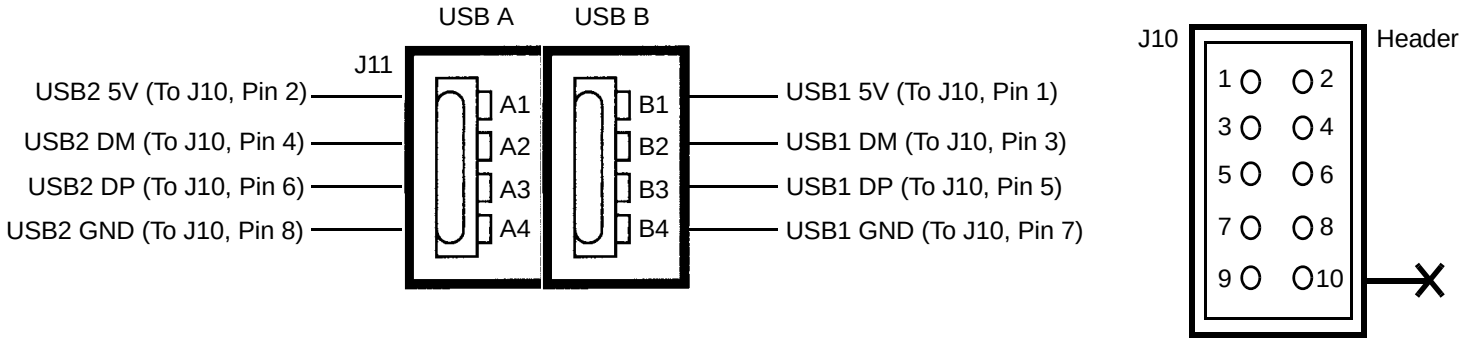


Figure E-4. Dual USB Connector Pinouts

Table E-1. Dual USB Connector Pinout Signal Descriptions (J10)

Pin	Signal Name	Pin	Signal Name
1	+5V	2	+5V
3	DM (Data Minus)	4	DM (Data Minus)
5	DP (Data Plus)	6	DP (Data Plus)
7	Ground	8	Ground
9	*Cut Off for Keying*	10	*No Connection*

E.1.2.2 Serial Port COM1

The RES Custom Module supports one **male** DB9 serial port connector (J9) on the front I/O panel (see *Figure E-5*)—COM1.

The COM1 pinout is listed in *Figure E-5*; pinout signal descriptions are described in *Table E-2*, which also shows the serial header (J8) connections to serial port J9.

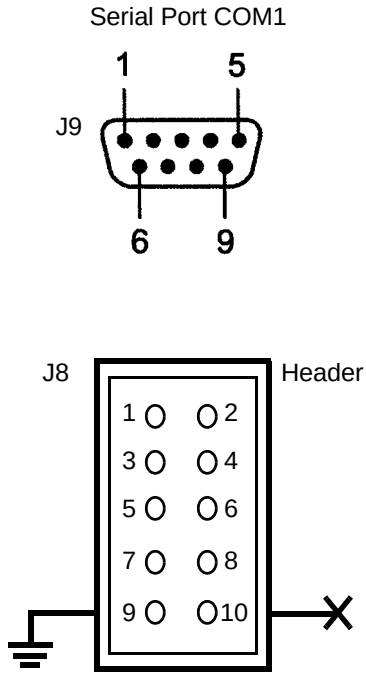


Figure E-5. COM1 Serial Connector Pinout

Table E-2. COM1 Serial Connector Pinout Signal Descriptions (J8 and J9)

J8 Pin	Signal Name	Connected to J9 Pin	J8 Pin	Signal Name	Connected to J9 Pin	J8 Pin	Signal Name	Connected to J9 Pin
1	DCD	1	4	RTS	7	7	DTR	4
2	DSR	6	5	TXD	3	8	RI	9
3	RXD	2	6	CTS	8	9	GND	5

E.1.2.3 Stereo Audio Ports (*Optional*)

The RES Custom Module supports one *optional* Stereo Audio Out jack on the front I/O panel (see *Figure E-6*).

The Stereo Audio Out pinout is listed in *Figure E-6*; header J1 pinout signal descriptions are described in *Table E-3*.

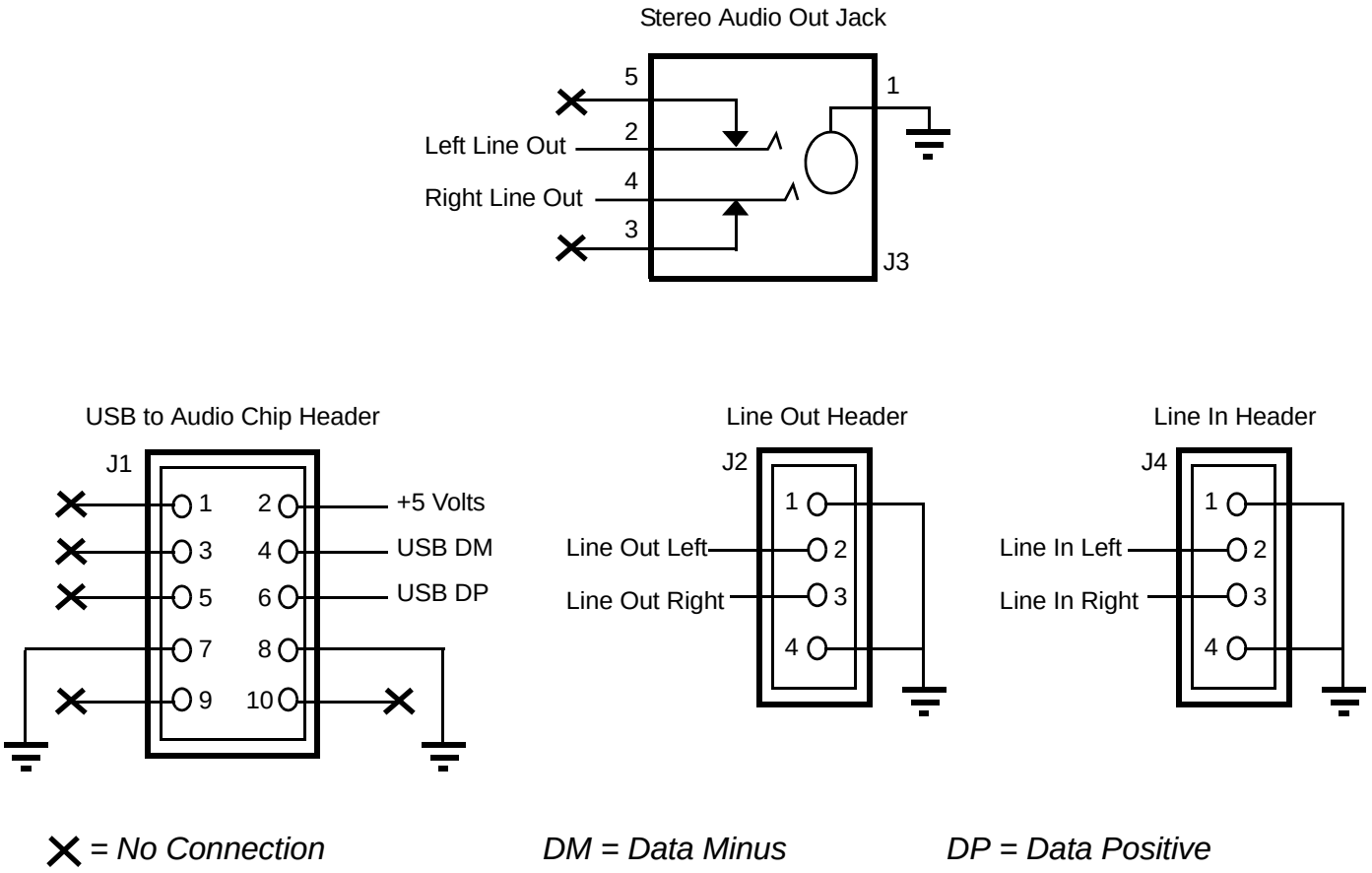


Figure E-6. Stereo Audio Connector Pinout

Table E-3. Stereo Audio Out Connector Pinout Signal Descriptions (J1)

Pin	Signal Name
1	*No Connection*
2	+ 5 volts
3	*No Connection*

Pin	Signal Name
4	Data Minus
5	*No Connection*
6	Data Plus

Pin	Signal Name
7	Ground
8	Ground
9	*No Connection*

E.2 Ordering the RES Audio/USB/Serial Port Custom Module

Because internal modifications must be made to the RES chassis in order to support the RES Audio/USB/Serial Port Custom Module, the Custom Module must be specified on the purchase order for your RES system. Please contact Themis for further information regarding the RES Audio/USB/Serial Port Custom Module. You can reach Themis on the web at www.themis.com, or by calling +1 510.252.0870.

Appendix F

Repackaging Instructions

F.1 Repackaging for Shipment

If it becomes necessary to return equipment to Themis Computer, it is very important that the equipment be shipped in the original packaging which provides adequate protection against crushing and moisture invasion. Failure to use original packaging materials, exactly as described in this appendix **may invalidate the warranty**. If the original packaging is no longer serviceable, or no longer available, please contact Themis Customer Support for a new shipping box to send back your RES-32XR3 ensuring protection from damage in transit. If it becomes necessary to ship in packaging other than that provided by Themis, equipment should be wrapped in a moisture resistant covering and placed either in double boxes, or in boxes with crush resistant insulation between the equipment and the outer walls of the container. When using the original packaging, the clear plastic membrane should be placed next to the equipment; i.e., up against the bottom, or down against the top. The following instructions assume the original packing components are still available, and in serviceable condition.

Caution: Failure to use the original Themis packaging materials, and failure to follow the instructions of this Appendix F, **may invalidate the warranty**. Please contact Themis if new packaging materials are required.

F.2 Packaging Components

The original packaging components are shown in *Figure F-1*, page F-2. They comprise a packaging box, bottom crush-resistant layer, and top crush-resistant layer. The bottom and top crush-resistant layers are identical components, placed so that the side with the plastic membrane is against the equipment.

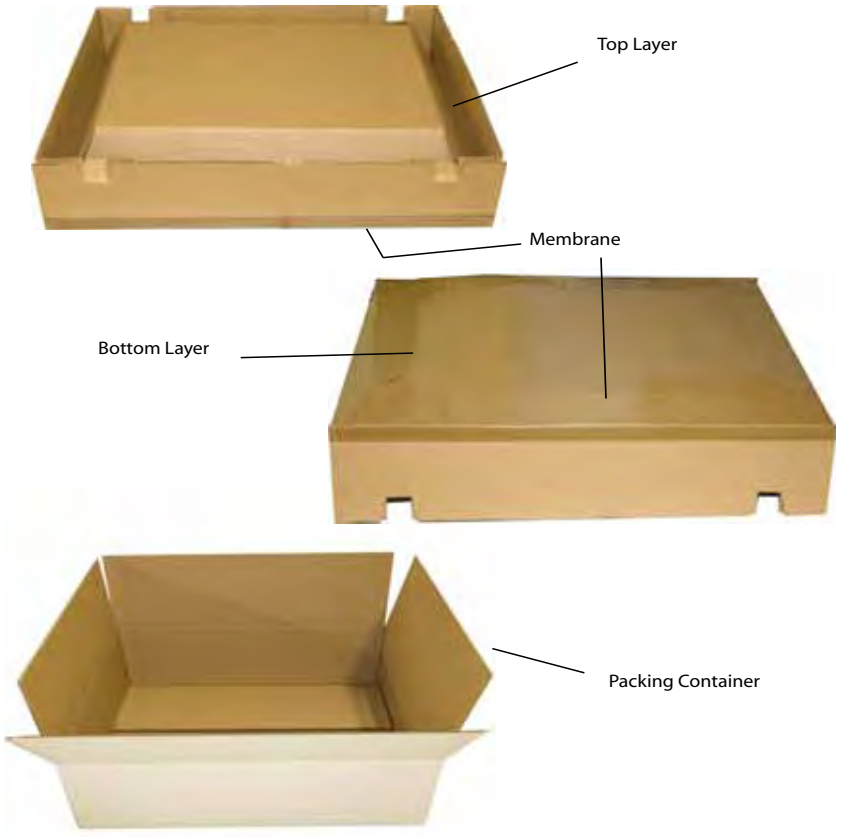


Figure F-1. Packaging Components

F.3 Instructions for Repackaging

Re-assemble the packaging material about the equipment in accordance with the following instructions (see *Table F-2* on page F-3):

- Inspect the original packaging materials for serviceability.
- Place one crush-resistant layer open side down, membrane side up, in the bottom of the box.
- Place the equipment on top of the bottom layer, right side up.
- Place the other crush-resistant layer, membrane side down, open side up, on top of the equipment.
- Press down on the top layer to firmly compress the layers around the equipment, and allow for the box flaps to be closed.
- Seal the top of the box with strong packaging tape, wrapping the tape completely around the box, both lengthwise, and crosswise.
- Prepare for shipment in accordance with the instructions received from Themis Computer.

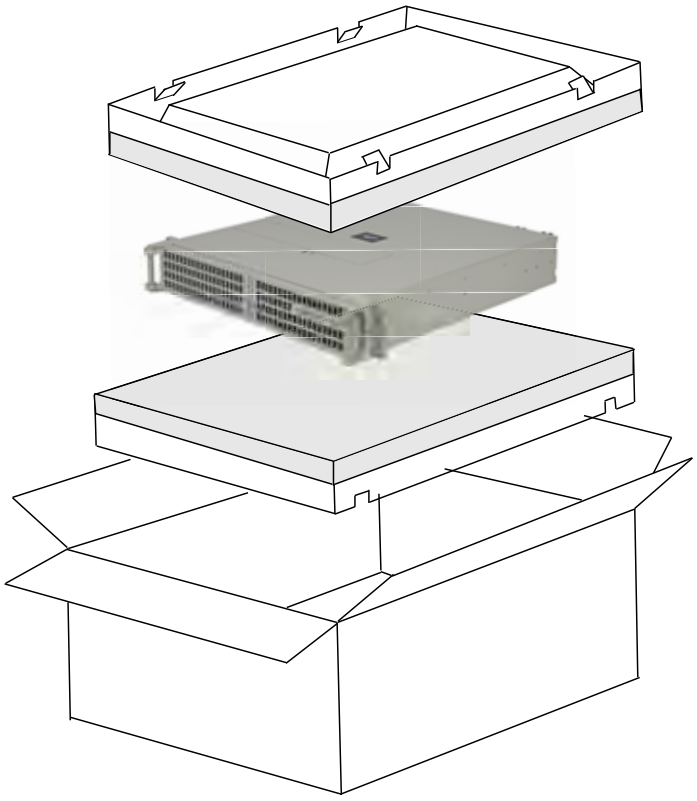


Figure F-2. Order of Assembly

Index

Numerics

1.44-MB 3.5" floppy drive *1-4*
120-mm-fan housing *2-1*
19” rack xxiv
240-pin DIMM sockets *1-2*
3RU form-factor *1-2*
5520 chipset *1-10*

A

AC
  power cord *1-19, 2-16*
  power LED *2-17*
  power socket *2-16*
  power supply *1-4*
accessory kit *1-19*
Advanced Settings Screen *3-5*
AMI BIOS *3-1*
AMI_FLSH Hyperterminal Screen *3-38*
antistatic bags *2-1*
antistatic wrist strap *2-1*
Appendix E, “Re-Packing Instructions” *1-19*
audio connectors *D-3*
Audio/USB/Serial Port Custom Module *D-1*
  COM1 Serial Connector Pinout *D-5*
  COM1 Serial Connector Pinout Signal Descriptions *D-5*
  header connectors *D-3*
  I/O cables *D-2*
  I/O headers *D-2*
  installation *D-2*
  ordering *D-7*
  PCB and Carrier *D-1*
  rear audio connectors *D-3*
  Stereo Audio Connector Pinout *D-6*
  Stereo Audio Out Connector Pinout Signal Descriptions *D-6*
  Stereo Audio Out jack *D-6*
  USB Connector Pinout Signal Descriptions *D-4*
  USB Connector Pinouts *D-4*

B

bezel *2-9*
BIOS Setup Utility
  Advanced Setup Configurations *3-5*
    ACPI Configuration *3-23*
    Advanced Chipset Control *3-10*
    BOOT Features *3-5*
    DMI Event Log *3-28*
    IDE/SATA Configuration *3-14*
    IP Address Configuration *3-26*
    IPMI Configuration *3-24*
    MAC Address Configuration *3-27*
    Northbridge Configuration *3-11*
    PCI/PnP Configuration *3-17*
    Power Configuration *3-6*
    Processor and Clock Options *3-7*
    QPI Links Speed *3-10*
    Remote Access Configuration *3-19*
    SEL PEF Configuration *3-28*
    Set LAN Configuration *3-26*
    Southbridge Configuration *3-13*
    Subnet Mask Configuration *3-27*
    Super IO Device Configuration *3-18*
    System Health Monitor *3-20*
    Trusted Computing *3-24*
    View BMC System Event Log *3-25*
  BIOS Recovery *3-35*
    Boot Sector Recovery from a Serial Port *3-36*
    Boot Sector Recovery from a USB Device *3-35*
    Boot Sector Recovery from an IDE CD-

ROM *3-36*
How to Recover the AMIBIOS Image *3-35*
Boot Configuration *3-31*
Boot Device Priority *3-31*
CD/DVD Drives *3-32*
Removable Drives *3-32*
Storage Drives *3-31*
Changing Configuration Data *3-2*
Exit Options *3-33*
Discard Changes *3-34*
Discard Changes and Exit *3-33*
Load Fail-Safe Defaults *3-34*
Load Optimal Defaults *3-34*
Save Changes and Exit *3-33*
Main Setup *3-3*
System Overview *3-3*
Security Settings *3-29*
Change Supervisor Password *3-29*
Change User Password *3-30*
Clear User Password *3-30*
Password Check *3-30*
Supervisor Password *3-29*
User Access Level *3-30*
User Password *3-29*
Starting *3-1*
Starting the Setup Utility *3-2*
Boot Settings Screen *3-31*

C

Cautions xxv
CD-RW/DVD-ROM drive *1-2*
Chipset *1-2*
COM1 / COM2 serial port/header *1-9*
Comments xxiv
components, major *1-4*
Configuration 3
SuperMicro X8DT3 motherboard xix
SuperMicro X8DT3-F motherboard xix
SuperMicro X8DT3-LN4F motherboard xix
Configuration 3 motherboards *1-1*
Configuration, system *2-17*
Connector Pinouts
PS/2 Keyboard and Mouse *A-1*
Serial Port *A-2*
USB Ports *A-2*

D

DAT drive *1-4*
Dimensions, chassis *1-2*
disk-drive adapter functions, super I/O *1-14*
DVI connector *2-17*

E

ECC SDRAM *1-2*
memory modules *2-4*
Electrical Specifications *1-16*
Electrostatic Discharge *1-17*
EMI xxiv
Environmental Specifications *1-17*
ESD
grounding techniques *2-1*
protected mat *2-1*
Ethernet *A-4*
Exit Options Screen *3-33*
Expansion slots *1-2*

F

flanges *2-15*
FLASH Recovery Screen *3-39*
floppy-disk drive *1-4*
form-factor, 3RU *1-2*
front bezel *2-9*
front panel *1-4*
fused AC *1-16*

G

General Specifications *1-15*
Gigabit Ethernet *A-4*
graphics card *2-17*

I

I/O Cables

attaching *D-3*
I/O Connectors
Ethernet LAN Port *1-9*
PS/2 keyboard *1-9*
PS/2 mouse *1-9*
Serial Ports *1-9*
USB Serial Ports *1-9*
I/O connectors *1-6*
I/O faceplates *1-4*
ICH10R (Southbridge) *1-2*
ICH10R + IOH-36D xxiv
Installation procedures *2-1*
installing rack-mount slides *B-1*
memory modules *2-4*
PCI cards *2-7*
Intel 5520 (Tylersburg) chipset xxiv
Intel 5520 chipset *1-2*
Intel Xeon CPU xix
Intel Xeon CPU, 1366-pin *1-2*
Introduction *3-1*

K

keys, front bezel *1-19*

L

LAN port *A-4*
latch locks *1-4*
LEDs *1-6*
NIC (Gb Ethernet) *1-8*
system *1-4*
Linux 5 Installation *C-1*
Linux Installation *2-17*
Creating a Custom Layout *C-9*
Edit Interface Pop-Up Screen *C-13*
Enter Installation Number *C-6*
Installation Begins *C-18*
Installation is Complete *C-19*
Language Selection *C-4*
Login Screen *C-20*
Master Boot Record (MBR) *C-11*
Network Devices List *C-12*
Option to Review or Continue *C-18*
Optional Packages *C-17*
Package Installation Default Screen *C-16*
Partitioning *C-7*
Power On *C-2*
Ready to use the Desktop *C-20*
Reviewing Option *C-8*
Selecting Layout Type *C-5*
Selecting Time Zone *C-14*
Setting Up Boot Loader *C-10*
Setting Up Root Account and Password *C-15*
Skip Key *C-2*
Welcome Screen *C-3*
Linux Installation Guide *C-1*
lithium battery *2-1*
installation *2-9*
lithium battery and socket, illustration of *2-8*
removal *2-8*

M

Main BIOS Setup Screen *3-3*
Major Components of the RES-32XR3 *1-5*
Manual Part Number ii
memory *1-2*
memory modules, ECC SDRAM *2-4*

N

Noise Level *1-17*
noise reduction *1-17*
noise specification *1-17*
Notes xxv

O

Opening the RES-32XR3 Front Doors *2-10*
Operating temperature *1-2*
Output Voltage *1-16*
Overheat LED *1-8*

P

Packaging and Shipping *1-19*
Packaging Components *E-2*
PCI cards *2-1*, *2-7*

Peripheral Support *1-2*
pinouts
Gigabit Ethernet LAN *A-4*
serial ports *A-2*, *D-5*
USB port *A-2*
Plugging in and Securing the AC Power Cords *2-16*
power
button *1-4*
button and LED *2-16*
cord sockets *1-4*
LED *2-17*
power cords *2-16*
power supply *1-2*, *2-1*
installation *2-14*
locking mechanism *2-13*
Power Supply Module *1-7*
PSM LED (Off) *1-7*
PSM LED (On) *1-7*
processor *1-2*
protective cover, chassis *2-1*
PS/2 keyboard *A-1*
PS/2 mouse *A-1*

R

rack-mount brackets *1-2*
with handles *2-15*
without handles *2-15*
Rack-Mount Slide Installation
Full View *B-3*
rack-mount slides xxiv, *1-2*, *1-20*, *B-1*
installation kit *B-2*
screw locations *B-1*
rack-mount slides (optional) *2-15*
rear panel *1-4*
Rear-Panel I/O *1-2*
Red Hat Enterprise Linux *C-1*
Remote On/Off Switch module *D-1*
configuration *D-2*
ordering *D-2*
Repackaging Instructions *E-1*
Order of Assembly *E-3*
Packaging Components *E-2*
Re-assembling *E-3*
Shipping *E-1*
RES *B-3*
RES Audio/USB/Serial Port Custom Module *D-1*
RES-32XR3 *1-1*
RES-32XR3 SVGA Connector-Pin Signals *A-3*
reset switch *1-4*
RES-x2XR3 20" Manual Matrix (AC and DC Power Supplies) xx
RES-x2XR3 Front I/O 16" Manual Matrix (AC and DC Power Supplies) xxii
RES-x2XR3 Manual Matrix (AC and DC Power Supplies) xxi
RES-x2XR3S/x1Xr3 17" Manual Matrix (AC and DC Power Supplies) xxi
right rack-mount bracket *2-15*
ROM File Extraction Screen *3-38*

S

Safety Instructions iv
Electrostatic Discharge (ESD) v
Grounding Methods v
Instructions for the Lithium Battery vi
Operation of Laser Source Devices v
screw locations for rack-mount slides *B-1*
Security Settings Screen *3-29*
Serial Port *D-3*
Serial Port COM1 *D-5*
serial ports *A-2*, *D-5*
Shock *1-17*
shock xxiv
Shock endurance *1-2*
Sidebars xxv
slides, rack-mount xxiv
slimline drive *1-2*
Sound Baffle Installed
front *1-17*
rear *1-18*
Southbridge *1-2*
Specifications

Altitude *1-15*
BTU Rating *1-16*
Dimensions *1-15*
Electrostatic Discharge *1-17*
Input Current *1-16*
Input Frequency *1-16*
Input Leakage *1-16*
Input Power *1-16*
Input VA Rating *1-16*
Input Voltage *1-16*
Maximum Wet Bulb *1-15*
Noise Level *1-17*
Packaging and Shipping *1-19*
Plug Type *1-16*
Power Factor *1-16*
Relative Humidity *1-15*
Shock *1-17*
Temperature *1-15*
Weight *1-15*
Stereo Audio Jack *D-3*
Stereo Audio Ports *D-6*
Storage Drives *2-10*
storage drives *2-1*
installation *2-11*
storage-drives
removal *2-10*
Super I/O *1-14*
SuperMicro X8DT3 motherboard xix
SuperMicro X8DT3-F motherboard xix
SuperMicro X8DT3-LN4F motherboard xix
SVGA connector *2-17*
Switch module, Remote *D-1*
system LEDs *1-6*
NIC (Gb Ethernet) *1-8*
Overheat *1-8*
Power *1-8*
Power Fail LED *1-7*
Power Fail LED (Left) *1-7*
Power Fail LED (Off) *1-7*
Power Fail LED (Right) *1-7*
System Power *1-16*

T

Technical Support *1-19*
temperature xxiv
Themis Customer Support ii
TTYA (COM1) *A-2*
Turning the System Off *2-17*
Turning the System On *2-16*

U

UARTs *1-14*
USB Port A and Port B *D-3*
USB Ports *D-4*
USB ports *A-2, D-4*
USB Serial Ports *1-9*

V

Version Revision History iii
Version 1.0 iii
Version 1.1 iii
Version 1.2 iii

W

Warnings xxv
Website Information xxiv

X

Xeon processors *1-2*

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